The Impact of High Stakes Testing On Curriculum, Teaching, and Learning

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Abstract

Research suggests that high stakes testing impacts teachers' decisions regarding curriculum and instruction, which, in turn, impacts student learning. Because Virginia administered *SOL* tests for Computer/Technology, then discontinued them, a study was possible comparing teachers' perceptions and actual student achievement of those taught while the high-stakes tests were in place and those taught after the tests were discontinued.

A survey was administered to all elementary and middle school classroom teachers in a midsize urban Virginia school division to determine their perceptions of the effects of high-stakes testing. Cross tabulations were performed based upon: school level; on whether the teacher had taught prior to, or only after, the *SOL* tests were implemented; and whether the teacher perceived he/she was teaching a high or low percentage of lower socio-economic status (SES) students.

In addition to the survey, the 2002 versions of the *Virginia Computer/Technology Standards of Learning* (*C/T SOL*) assessments were administered to all 2005 fifth and eighth grade students within the same school division. Statistical comparisons of the means of raw scores from the 2002 fifth (n = 625) and eighth (n = 641) grade groups and the 2005 fifth (n = 583) and eighth (n = 522) grade groups were conducted. Comparisons were also conducted on scores from each test between groups of students who qualified for free and reduced price lunches and those that did not qualify. Finally, statistical comparisons were made between the scaled scores of students who were eighth graders in 2005 (n = 397) and their scaled scores as fifth graders when tested in 2002.

The study found a majority of teachers felt high-stakes testing creates pressure and changes the focus of instruction to tested areas at the expense of other activities and non-tested content.

When the means of the scores of students who took the *C/T SOL* tests in 2002 were compared to those from 2005, the scores for the students taught under the high-stakes testing pressure were significantly better than those tested in 2005. Further, this gap in student achievement was more pronounced for lower SES students, suggesting a widening of the "digital divide."

Dedication

To Dr. Stephen C. Smith, friend and colleague, for his countless hours of reading copy and faithfully attending the Monday morning breakfast progress reports. I am forever grateful for his advice, support, and encouragement.

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The completion of this research project would not have been possible without the support, time and expertise of the author's committee. My appreciation is extended to Ms. Janice McBee, Dr. Ken Potter, and Dr. John Wells. A special thank you is extended to my committee chair, Dr. Mark E. Sanders, for his patience, support, and friendship throughout this long process.

I would also like to thank Dr. Paul McKendrick, superintendent, for granting me permission to conduct this study. I am grateful for his support and for the letters he wrote to the principals to enlist their assistance with the teacher survey and student testing.

I am thankful for the assistance of the Instructional Technology Specialists and the elementary and middle school principals in the administration of the assessments used in this study.

I am grateful for the support and encouragement I received from friends and colleagues as I pursued this degree.

I want to thank my mom and dad, Jerome and Gloria Sullivan, for their support and encouragement, and for my dad's subtle reminders that I need to complete this study in his lifetime.

Finally, to my wife, Sally, and my sons, Patrick and Ryan, I thank you for your love and support and for the sacrifices you made in order for me to complete the degree requirements.

TABLE OF CONTENTS

TABLES

Figures

CHAPTER I: INTRODUCTION

Teachers as Decision Makers

Teachers, as they interact with students, are the ultimate decision-makers regarding what is taught and how it is taught. They make decisions about how much time to allocate to a particular school subject, what topics to cover, when and in what order to teach those topics, to what standards of achievement, and to which students. Collectively, these decisions and their implementation define the content and methods of instruction. In principle, it is possible for all these decisions to be made autonomously by the teacher, but in practice these decisions are usually influenced by external forces. These forces include laws, policies, regulations, and other directives of legislatures and boards, as well as the influences of administrators at the district and school levels (Schwille, Porter, Belli, Floden, Freeman, & Knappen, 1983).

In this semi-autonomous role, teachers are better described as political brokers than as independent leaders or powerless followers. They enjoy considerable discretion, being influenced by their own ideas of what teaching and learning ought to be, but they are also clearly persuaded by external pressures. This view represents middle ground in the classic sociological contrast between professional autonomy and bureaucratic subordination. It casts teachers as rational decision makers who take higher level policies and other pressures into consideration in their calculation of the benefits and costs of their instructional decisions (Schwille et al., 1983).

Porter (1998) reiterated this idea of teachers as political brokers by describing teachers as individuals who understand and interpret the various policies and practices that bear upon their content decisions and, at the same time, take into account their own repertoire of content knowledge and pedagogical strategies as well as their own predilections as to what is most important and appropriate for their students. In making these decisions, teachers receive advice and support from, and are influenced by, a variety of sources. Throughout the last three decades, the sources of influence on classroom teachers have changed, and some would argue have increased. The pressure of accountability standards and high stakes testing may be one example of these influences.

Testing as an Influence on Teachers

Prior to the 1970s there was little concern about tying high stakes outcomes to testing. The federal government and the states used large-scale tests to monitor the status of the educational system and to provide information that might be helpful to teachers and large groups of students. However, specific rewards or sanctions were seldom associated with performance. For example, the National Assessment of Educational Progress (NAEP), the only large scale federally commissioned achievement test, was designed solely with a monitoring role in mind (Stecher, 2002).

Beginning with the minimum competency testing movement in the 1970s, policymakers began to use test results in new ways—specifically as the basis for decisions about individual performance (Herman, 2004). Tests grew more common in the 1980s, and the rationale for large-scale testing expanded from judging the performance of groups of students to influencing teaching practice (Popham, 1987).

Standards and Accountability Movement

In 1983, The National Commission on Education released A *Nation at Risk*, which became the most influential report on education at that time. *A Nation at Risk* called for an end to minimum competency testing and the commencement of a high stakes testing movement that was intended to raise the nation's standards of academic achievement in an unprecedented manner. Citing declines in various indicators of U.S. superiority, the document created a nation-wide panic around the perceived weakening condition of the American education system (Amrein & Berliner, 2002).

A Nation at Risk had its desired effects as The National Commission on Education recommended that states institute high content standards to homogenize and improve curricula and conduct rigorous assessments to hold schools accountable for meeting those standards. In some ways, *A Nation at Risk* was the initial catalyst for standards-based reform in public education (Amrein & Berliner, 2002).

In systemic, standards-based reform, alignment is the core idea (Smith & O'Day, 1991). An instructional system is to be driven by content standards, which are translated into assessments, curriculum materials, and professional development, which are all, in turn, tightly aligned back to the content standards. The intent is that a coherent message of desired content will influence teachers' decisions about what to teach, and teachers' decisions, in turn, will translate into their instructional practices and ultimately into student learning of the desired content. Federal, state and local policymakers hope to influence teachers sufficiently that they then teach exactly what is prescribed in the content standards (Porter, 2002).

As an example, the state board of education in Virginia launched one of the nation's most ambitious standards-based reform efforts in the 1990s. These officials sought to clarify what students needed to know and to hold students and educators accountable for demonstrating performance. The effort to launch and then implement the state's *Standards of Learning* (*SOL*) program would provide an exemplary case study of all the political and policy-making factors that accompany any push for high-stakes accountability (Hess, 2002).

In 1995, the Virginia Board of Education established state-wide *SOL* in the areas of English, math, social studies, science, and computer/technology. Beginning in 1998, cumulative exams were administered once each year in the four core content areas to students in grades three, five, and eight. *C/T SOL* were tested at the end of fifth and eighth grades. However, it was not only the policy makers at the state level who were working toward more rigorous standards and accountability for public educators and their students.

On January 8, 2002, President George W. Bush signed into law the No Child Left Behind Act of 2001 (NCLB) which reauthorized the Elementary and Secondary Education Act of 1965 and modified the 1994 reauthorization known as The Improving America's Schools Act (Chapman, 2005). NCLB is based on four basic principles: stronger accountability for results, increased flexibility and local control, expanded options for parents, and an emphasis on methods that have been proven to work (USDOE, 2002). Also with NCLB comes annual testing in the "core" areas of reading, mathematics, and science. The law states that by 2005 – 2006, testing is required in

reading and math in grades three through eight and once in high school. By 2007 – 2008 testing in science is also to occur at least once in each grade span, three through five, six through nine, and ten through twelve. The Virginia *SOL* exams serve as the testing instrument to provide the necessary data for No Child Left Behind and the subsequent Adequate Yearly Progress (AYP) targets.

Consequences of Testing

Much of the research on state testing programs addresses how these accountability measures affect what is taught, and in particular, how teachers pay attention to what is tested and adapt their curriculum and teaching accordingly. For example, of the 722 Virginia teachers surveyed by McMillan, Myran, and Workman (1999), more than 80% indicated that the state *SOL* test had impacted their instruction, particularly with regard to the content focus of daily lessons.

Moon, Brighton and Callahan (2003 p. 55) in a survey of California, Texas, and Virginia teachers, concluded that "content delivered to students also seems to be directly affected by the state testing pressure. Subjects not included in the state tests often were accorded low priority for most of the school year to create larger blocks of instruction for tested subjects and skills."

If this unintended consequence of the standards and accountability movement does exist, and if this narrowing of the curriculum results in a decrease in student's knowledge and skills in non-tested areas, then educational policy makers and stakeholders at all levels might wish to consider this factor as they move forward with reforms.

Statement of the Problem

With NCLB's increased emphasis on the subjects of math, science, and English/reading, some educators voiced concerns about the de-emphasis of instruction in other areas like art, music, physical education, and computer/technology (Chapman, 2005). In the case of computer/technology in Virginia, this fear of a de-emphasis of the content was ostensibly justified as the *SOL* assessments for computer/technology were removed from the state testing program in 2002.

In a Superintendent's Memo (No. 128) dated September 27, 2002, then Virginia state superintendent, Jo Lynne DeMary, informed local school divisions that beginning with the fall 2002 administration of *SOL* testing the computer/technology examinations would no longer be given. The memo did state, however, that "although computer technology will no longer be assessed, the computer/technology standards remain in effect. Teachers should continue to provide instruction in the content of the standards when appropriate."

While teachers may well continue to "provide instruction in the content of the standards when appropriate," high stakes testing may have the unintended consequence of pressuring teachers to make decisions that narrow the curriculum in non-tested areas. The effect of increased pressure from NCLB for students to perform well on "core" *SOL* exams in Virginia, coupled with the removal of the state assessments in computer/technology, provided a case to examine evidence of a possible de-emphasis on "non-core" subjects. If a tendency to narrow the curriculum exists, it might result in a lesser quality of instruction and, therefore, less student achievement in these non-tested content areas. The several years of data collected through the state-wide

administration of the Virginia fifth and eighth grade *C/T SOL* assessments provided an opportunity to investigate this question.

Further, because this study was based on knowledge of technology, the research in the field suggested another topic of interest – the "digital divide." The term "digital divide" refers to the perceived knowledge gap between those who have access to the latest technologies and those who do not. Underlying this concept is the notion that since we are now in the midst of the Information Age, those not having access to information through the latest technologies are considered to be disadvantaged (National Postsecondary Education Cooperative (NPEC), 2004). Despite schools across the country achieving near parity in the availability and quality of access, there continue to be significant disparities across different groups of children and adolescents in terms of computer and Internet use. For example, socio-economic status (SES) is related to differences in computer and Internet use. Lower SES students living in poor families were less likely to use computers (81 percent) and the Internet (37 percent) in 2001 than children and adolescents living in high SES families (93 percent and 65 percent, respectively) (Patrick, 2004). However, schools do appear to help narrow the digital divide in terms of computer use since differences in the rates of computer use are smaller at schools than they are at home when such characteristics as family income and parental education are considered (Department of Commerce (DOC), 2002; DeBell, M. & Chapman, C., 2003).

There is ample evidence that a digital divide still exists between lower SES students and their peers, and the majority of these lower SES students rely on schools for both computer technology and Internet access (Eamon, 2004; NPEC, 2004; Patrick, 2004). Research also finds that completing school assignments is the most popular use of the Internet for children and adolescents ages 5 to17, followed by e-mail and playing games, all of which are done by those students who use the Internet (DOC, 2002; DeBell & Chapman, 2003)

As stated earlier, the effect of increased pressure from NCLB for students to perform well on "core" *SOL* exams in Virginia, coupled with the removal of the state assessments in computer/technology, provided a case to examine evidence of a possible de-emphasis on "non-core" subjects. If a tendency to narrow the curriculum exists, it might result in a lesser quantity and quality of instruction and, therefore, less student achievement in the computer/technology content area. Further, if there is lesser quality and quantity of instruction in computer/technology content, it might result in even less student achievement for lower SES students as compared to their peers. The data collected through the state-wide administration of the Virginia fifth and eighth grade *C/T SOL* assessments over several years provided an opportunity to investigate this question as well.

Significance of Study

Recognizing the potential unintended consequences of high stakes testing on teachers' decision-making can assist local and state education leaders as they make policy decisions regarding curriculum and instruction, and therefore, student knowledge of tested and non-tested content standards.

Once states began to implement test-based accountability systems, it prompted an interest in the effects of testing on teaching practices. Large-scale studies of the effects of testing were

conducted in a number of states that implemented such accountability systems. The bulk of this research on the effects of testing has been conducted using only surveys and case studies.

This study employed the use of a survey to determine teacher perceptions of the effects of high stakes testing on teaching and learning. However, unlike previous studies, this research also generated quantitative data by testing students in a non-core content area and then compared that data to data collected when high stakes testing in that content area was in place in order to determine if any significant impact on student achievement occurred following the removal of the testing and its associated pressure.

Purposes of Study

The purpose of this study is two-fold. The first purpose is to determine teachers' perceptions regarding the consequences of high stakes testing and its influence on teachers' decision-making. The second purpose of this study is to determine if the removal of state required computer/technology testing results in a decrease in student knowledge of the computer/technology content.

Research Questions

Teacher Perceptions

This study investigated a number of issues raised separately by several previous studies, looking particularly at teacher perceptions of the effects of high stakes testing on their decisions regarding the curriculum and the subsequent impact on teaching and learning processes in schools (Taylor et al., 2003; Kubow & Debard, 2000; Herman & Golan, 1998). Some evidence suggests that teachers in different school levels (elementary, middle, and high school) have varied perceptions of the classroom effects of high-stakes testing accountability (Kubow & DeBard, 2000); therefore, school levels were considered in relation to the research questions. Additionally, because there is some evidence to suggest that teachers and students located in schools with various income-levels are affected differently by the current accountability programs, the questions for research were considered in terms of whether teachers perceived they taught high, middle, or low numbers of students who qualify for free and reduced price lunch (Hoffman et al., 2001; Kubow & DeBard, 2000; Paris, Lawton, Turner, & Roth, 1991). Finally, the assumption was also made that the perceptions of teachers who taught prior to the implementation of *SOL* testing in 1998 might differ from those who have taught only under the current assessment program.

Following Creswell's (1994) recommendation for conducting exploratory research, this study was organized in terms of research questions rather than stated hypotheses. Research questions one through eight pertain to teachers' perceptions and questions nine through fourteen concern the impact on student learning. The questions for research were as follows:

1. What do teachers in a Virginia mid-size urban school division perceive are the effects of high stakes *SOL* testing on their classroom instruction?

2. How much and from where do these teachers feel pressure to improve their students' test scores?

3. Do teachers in the school division perceive that the *Computer/Technology SOL* are still being taught despite no longer being assessed by the Virginia Department of Education?

4. Do teachers in the school division perceive that fifth and eighth grade students in the 2004 – 2005 school year know more, less, or about the same amount of *Computer/Technology SOL* content as did their peers from three years ago?

5. Do teachers in the school division perceive that fifth and eighth grade students in the 2004 – 2005 school year who qualified for free and reduced price lunch know more, less, or about the same amount of *Computer/Technology SOL* content as did their peers from three years ago?

6. Do elementary level teachers have different perceptions regarding the previous research questions than did middle level teachers?

7. Do teachers with teaching experience prior to the implementation of *SOL* testing in 1998 have different perceptions regarding the previous research questions than did those with teaching experience only under the current assessment program?

8. Do teachers with perceived high levels of lower socio-economic status students have different perceptions regarding the previous research questions than did those with perceived middle or low levels of lower SES students?

Impact on Student Learning

9. Do fifth and eighth grade students in a mid-size urban school division in the spring of 2005 know more, less, or about the same about computer/technology than did students in the spring of 2002, as measured by raw scores on the 2002 version of the *Virginia Computer/Technology SOL* assessment instruments?

10. Do the 2002 fifth and eighth grade students in the school division who qualified for free and reduced price lunch know more, less, or about the same about computer/technology as did their grade level peers?

11. Do the 2005 fifth and eighth grade students in the school division who qualified for free and reduced price lunch know more, less, or about the same about computer/technology as did their grade level peers?

12. Do the 2005 fifth and eighth grade students in the school division who qualified for free and reduced price lunch know more, less, or about the same about computer/technology as did the 2002 fifth and eighth grade students in the school division who also qualified for free and reduced lunch?

13. Do the 2005 eighth grade students in the school division know more, less, or about the same about computer/technology as they did in 2002 as fifth graders as measured by their scaled scores on the 2002 fifth and eighth grade versions of the *Virginia Computer/Technology SOL* assessment instruments?

14. Do the 2005 eighth grade students in the school division who qualified for free and reduced price lunch know more, less, or about the same about computer/technology as they did in 2002 as fifth graders?

CHAPTER II: REVIEW OF THE LITERATURE

The No Child Left Behind Act (NCLB), signed into law in 2002, created a system for sweeping, drastic, nation-wide accountability with serious sanctions for underperforming schools and school districts. Now in its fourth year, the sanctions imposed by this law are being implemented, and the discussion about the intended and unintended consequences is regularly seen in the media. For example, *The New York Times* (Dillon, 2005) reported that the then secretary of education, Margaret Spelling, sought to set a new, more cooperative tone in her response to resistance to No Child Left Behind. In the article, Dillon writes that 30 states have raised protests about the law and mentions Connecticut's suit over the alleged failure of the Education Department to fund its NCLB testing mandates. However, statements from Secretary Spelling indicated that although some flexibility on specific issues may be forthcoming, the "core pillars" of this law will not be changed. The vision of the expanded federal role in public education, including all aspects of standards and accountability, is here to stay.

Standards, Measurement, and Accountability

The vision of a nation-wide, standards-based accountability system appears to be drawn from the content standards discussions at the state and national levels. As various groups worked to reach consensus on what is important for all students to know and be able to do if they are to be successful in the 21st century, others worked to design systems to hold everyone in the system—from policymakers to educators to students—accountable for meeting those standards (Herman, 2004).

A vital piece needed to move from content standards to accountability was a form of measurement. Accountability requires standards-based assessments to ensure students are learning what is expected. NCLB took the accountability movement even farther, focusing not only on "what" is expected (the content standards), but also on "how well" it should be learned (performance standards) (Linn & Herman, 2002).

Once content standards, testing, and performance standards are set, the final piece of accountability, sanctions for underperforming schools, can be put into place. Thus, the performance standards, and the assessments upon which they are based, are at the heart of the educational accountability movement. While many non-educators may be unaware of the specific content and performance standards in the public schools in their states, these performance standards become more evident to stakeholders as large-scale assessments to measure them are developed and implemented. Emanating from the state and/or local level, the assessments make explicit what content is to be learned and, as performance levels and minimum passing scores are established, they set parameters for how well students, and schools, have to do to meet the standards. The assessments thus become a primary vehicle for communicating what the standards really mean, and they provide strong signals to teachers and schools about what they should be teaching and what students should be learning. Unique to standards-based assessment as well is the intention not only to signal to teachers what to teach but also, with the use of multiple types and forms of assessment, to provide clues on how to teach it (Resnick & Resnick, 1985; Taylor, Shepard, Kinner, & Rosenthal, 2003).

Teachers as Decision Makers

Teachers, as they interact with students, are the ultimate decision-makers of what is taught and how it is taught. They make decisions about how much time to allocate to a particular school subject, what topics to cover, when and in what order, to what levels of achievement, and to which students. Collectively, these decisions and their implementation define the content and methods of instruction. In principle, it is possible for all these decisions to be made autonomously by the teacher, but in practice these decisions are usually influenced by external forces. These forces include laws, policies, regulations, and other directives of legislatures and boards, as well as the influences of administrators at the district and school levels (Schwille et al., 1983).

In this semi-autonomous role, teachers are better described as political brokers than as independent leaders or powerless followers. They enjoy considerable discretion, being influenced by their own ideas of what teaching and learning ought to be, but they are also clearly persuaded by external pressures. This view represents middle ground in the classic sociological contrast between professional autonomy and bureaucratic subordination. It casts teachers as rational decision makers who take higher level policies and other pressures into consideration when calculating the benefits and costs of their instructional decisions (Schwille et al., 1983).

Porter (1998) reiterated this idea of teachers as political brokers by describing teachers as individuals who understand and interpret the various policies and practices that bear upon their content decisions and, at the same time, take into account their own repertoire of content knowledge and pedagogical strategies as well as their own predilections as to what is most important and appropriate for their students. In making these decisions, teachers receive advice and support from, and are influenced by, a variety of sources.

Policy Makers Influence on Teachers

State standards and assessments are developed to which district standards and assessments are aligned. Classroom instruction is then aligned with district standards and assessments. What students learn in a teacher's classroom can be more or less aligned to that instruction. Alignment is a measure of the consistency of standards and assessments within a district or state - that is, the degree to which these policy instruments deliver a coherent set of expectations to teachers (Porter, 2002).

Alignment is the core idea in systemic, standards-based reform (Smith & O'Day, 1991). An instructional system is to be driven by content standards, which are translated into assessments, curriculum materials, and professional development, which are all, in turn, tightly aligned back to the content standards. The intent is to send a coherent message of specific desired content in order to influence teachers' decisions about what to teach, and to some degree, how to teach it, to ultimately ensure student learning of the desired content. Policymakers hope teachers teach what is described in content standards. So, in addition to the content of instruction, local, state, and federal policymakers create some of the influences on teachers' pedagogical decisions. Accountability standards and the subsequent assessments are an example of these influences (Porter, 2002).

Influence of Standards and Accountability Measures on Teachers

Standards-based assessments are supposed to provide valuable information to schools and policymakers by measuring the status and progress of student learning. The test results are intended to support important insights on the nature, strengths, and weaknesses of student progress relative to the standards, and educators are expected to use this feedback to make appropriate curriculum and instruction decisions as they redirect their efforts toward improving student learning. Policy makers try to strengthen the accountability aspects of the system by establishing specific goals for school performance and attaching incentives and sanctions to achieving, not achieving, or surpassing these goals (Herman, 2004). This describes in many ways where the standards and accountability movement is now, although it certainly has not always been this way, as the role of high stakes testing in public education can be traced back at least twenty years (Sloan & Kelley, 2003).

Background on Standards and Accountability Measures

Prior to the 1970s there was little concern about tying high stakes outcomes to testing. The federal government and the states used large-scale tests to monitor the status of the educational system and to provide information that might be helpful to teachers and large groups of students. However, specific rewards or sanctions were seldom associated with performance. For example, the National Assessment of Educational Progress (NAEP), the only large scale federally commissioned achievement test, was designed solely with a monitoring role in mind (Stecher, 2002).

Beginning with the minimum competency testing movement in the 1970s, policymakers began to use test results in new ways—specifically as the basis for decisions about individual performance (Herman, 2004). Tests grew more common in the 1980s, and the rationale for large-scale testing expanded from judging the performance of groups of students to influencing teaching practice (Popham, 1987).

The Call for Greater Accountability

In 1983, The National Commission on Education released *A Nation at Risk*, which became the most influential report on education at that time. *A Nation at Risk* called for an end to the minimum competency testing movement and the commencement of a high stakes testing movement that would raise the nation's standards of achievement in an unprecedented manner.

Although history has questioned the accuracy of the report, it did argue persuasively that schools in the United States were underperforming in comparison to other countries and that the United States was in jeopardy of losing its standing in the world. Citing declines in national and international student test scores, deterioration in school quality, a diluted and unfocused curriculum, and setbacks in other indicators of U.S. superiority, the document created a nation-wide panic around the perceived weakening condition of the American education system (Amrein & Berliner, 2002).

Despite questions about the report's scholarly credibility, *A Nation at Risk* had its effects. The National Commission on Education called for more rigorous standards and accountability mechanisms to lift the United States out of its purported educational recession. The Commission recommended that states institute high standards to homogenize and improve curricula and

conduct rigorous assessments to hold schools accountable for meeting those standards. In some ways, *A Nation at Risk* was the initial catalyst for standards-based reform in public education (Amrein & Berliner, 2002).

Reactions to Increased Measures of Accountability

In light of the changes that occurred in the uses of large-scale testing in the 1980s and 1990s, researchers began to investigate teachers' reactions to external assessment. For example, one of the criticisms of high-stakes testing during the 1980s was that the emphasis on minimal competency levels for students resulted in schools teaching directly to these minimal competencies rather than the broader curriculum (Sloane & Kelly, 2003).

In the mid-1990s, states began to implement state-wide, test-based accountability systems, prompting renewed interest in the effects of testing on the practice of teaching. Large-scale studies of test validity and the effects of testing were conducted in a number of states that implemented such accountability systems. The bulk of this research on the effects of testing has been conducted using surveys and case studies.

Standards and Testing Combine for Even Greater Accountability

With the advent of formal accountability systems in the 1990s, policymakers embraced a new, more potent vision for the role of assessment. They envisioned tests, often in combination with standards, as a mechanism to influence changes in practice, hoping to use them to exert a strong positive effect on schooling (Stecher, 2002).

As an example, the state board of education in Virginia launched one of the nation's most ambitious standards-based reform efforts in the 1990s. These officials sought to clarify what students needed to know and to hold students and educators accountable for demonstrated performance. The effort to launch and then implement the state's nationally hailed *Standards of Learning* (*SOL*) program would provide an exemplary case study of the all the political and policy-making factors that accompany any push for high-stakes accountability (Hess, 2002).

Background on the Virginia Standards of Learning

The design and implementation of an accountability program in Virginia included four key components. First, it required the creation of demanding academic standards in grades K–12. The new *SOL* were adopted in June 1995. Second, it called for criterion-referenced tests that were aligned specifically with Virginia's *SOL* to measure student progress in learning the new standards. The tests were officially administered for the first time in spring 1998. Third, student test achievement was linked to school accreditation and to student graduation. Finally, school performance was to be reported to parents on a broad range of indicators—from test results to school safety—in annual School Performance Report Cards. The report cards were first issued in March 1999, providing public information on school safety, student performance, and a variety of other measures.

The *SOL* tests are criterion-referenced tests designed to measure whether students have mastered the specific content laid out in the state curriculum. The tests are short and consist entirely of multiple-choice questions in all subject areas except English. The English test also includes a writing component. A total of twenty-seven individual *SOL* tests are administered in a variety of

subjects in grades three, five, and eight and at the end of specific courses at the high school. The tests range in length from thirty to sixty-three multiple-choice questions. To earn their diplomas, students have to earn verified course credits by passing six of the twelve end-of-course (EOC) exams offered at the high school level.

In October 1996, Virginia chose Harcourt Brace Educational Measurements to develop the *SOL* test questions. At Harcourt Brace, about five thousand test questions were initially drafted by test-question writers who sat down with the *SOL* and test guidelines for a period of six months. The questions were given to twenty-seven content-review committees—one for each exam—that included public educators from across Virginia. The revised questions were field-tested in 1997 and the content-review committees examined the results to flag problem questions (Hess 2002).

At the heart of the *SOL* accountability system was the premise that students would not graduate from high school until they had demonstrated acceptable performance. Graduation requirements contingent on acceptable *SOL* performance were slated to take effect for the first time in 2004. Fully implementing the *SOL* required the board to establish passing scores for the tests, to decide which students to exempt from the tests, and to determine what to do with students who failed to pass the tests. In October 1998, with the first administration of the *SOL* looming, the Board of Education had to set passing and proficient (advanced) scores for the *SOL* tests. To assist in this task, the board convened eight twenty-person advisory committees, each composed primarily of teachers and administrators.

In accord with a 1992 legislative directive that instructed the Board of Education to devise performance-linked Standards of Accreditation for schools, the board in 1997 adopted a performance-based accreditation system. The new accreditation requirements were scheduled to take effect in 2006–07, ten years in the future. In adopting the standards, the board made clear that school accreditation would depend upon student performance on the *SOL*, but did not address the question of what losing accreditation would mean for a school. *SOL* proponents did not begin to routinely acknowledge the system's coercive intent in their public rhetoric until after 1997. To be fully accredited, 70 percent of a school's eligible students would have to pass the *SOL* tests in each of the four core academic areas. An exception was crafted for the third- and fifth-grade levels, where the board set the required English pass rate at 75 percent and determined that science and history/social science scores would not be used to calculate a school's accreditation rating. Critics of this policy argued that not counting science or history/social science scores in elementary accreditation would send a message that these subjects were not important and could hurt instruction (Hess 2002).

Growth of State Standards-Based Assessment Programs

Having been spurred at least in part by federal policy, states across the country are using testing programs built in this model, and within them have created sizeable incentives for performance. Examples include substantial cash awards for schools and teachers who meet or exceed their goals; and at the other extreme, schools that don't make the grade are threatened with takeover (Stecher, 2002; Herman, 2004; Abrams & Madaus, 2003). Dramatic incentives for students also have been added. A growing number of states are adopting policies that require students to meet a performance standard to be promoted to the next grade or to be granted a high school diploma. Through such rewards and sanctions, policymakers seek to motivate teachers, students, and the

community to pay attention to the standards, and also to the analysis of assessment results to improve subsequent performance. The system thus promotes a continuous improvement model aimed at enabling all children to reach the standards: establish and monitor goals and benchmarks, assess progress, then use results on goal attainment to improve performance (Herman, 2004).

The vast majority of states in the United States have implemented or are in the process of implementing school accountability systems as a central component of efforts to improve student achievement (Borko, 2005). These state reform efforts are generally organized around a set of academic standards adopted at the state level. Success is measured, at least in part, by scores on statewide tests aligned with the standards. Typically, districts and schools are the unit of accountability (Elmore, Abelmann, & Fuhrman, 1996). Local educators are responsible for translating into practice the goals embodied in the standards and accompanying assessments. The goal of the assessments is to provide a valid set of inferences related to particular expectations for students and schools. However, states vary in the way they expect such assessments to map to standards. In addition to difficulty levels, testing programs also vary, at least nominally, in the strategies they use to measure performance (Linn, Baker, & Betebenner, 2002).

The increase in states' use of academic standards and tests as educational policy tools has occurred very rapidly. The number of states with mandated testing programs grew from 29 in 1980 to 46 in 1992. By 2001, 48 states were in the process of developing or had already implemented standards-based assessments, and 33 had accountability systems that hold students, teachers, school administrators, and/or district administrators responsible for student performance (Stecher & Barron, 1999; Stecher & Chun, 2001).

Every state has now instituted a statewide testing program and curricular standards or frameworks-except Iowa, where local districts develop their own standards and benchmarks. The state tests vary substantially in difficulty, content, item format, and, especially, the sanctions attached to test performance. For example, Massachusetts, New York, Texas, and Virginia use test results to award high school diplomas. Other states like Missouri, Rhode Island, and Vermont, use students' performance on the state tests to hold schools, rather than students, accountable. Still others, including Iowa, Montana, Nebraska, and North Dakota, currently attach no sanctions to test performance (Abrams & Madaus, 2003).

Academic standards and tests have become even more central to state educational reform efforts with the passage of the No Child Left Behind (NCLB) Act of 2001 (Borko, 2005). One central assumption of these reform efforts is that they will motivate improvements in curriculum content and instructional practices. As McDonnell (1994 p. 406) explained, state policy makers "intend for the assessment system and the policies linked to its use to shape not just student outcomes, but also what and how students are taught."

State Standards and Assessments Impact on Schools and Classrooms

At the same time, states have generally given only limited attention to the processes through which schools foster curricular and instructional changes and how teachers adapt classroom practices to accommodate the new standards and broadened achievement expectations. Similarly, most recent research on large-scale assessment has focused on the quality of scores and their

appropriateness for accountability purposes (Linn, 2003). Much less attention has been paid to the effects of standards- based assessments on school and classroom practices (Borko, 2005).

At the start of the standards movement, leading researchers and advocates for standards-based reform emphasized the contrast between the new reform calling for high standards and previous reform efforts aimed at minimum competencies and basic skills. However, the common thread that ran through all three decades of educational reform was the call for accountability. By the end of the 90's, across the nation the accountability aspect of the reform had become more strident. Politicians were no longer patient with the idea that profound changes in the educational system would require concerted effort over a long period of time (Taylor et al., 2003).

Newer descriptions of what standards-based reform is all about emphasize "accountability" as the necessary lever to create incentives for teachers and schools to attend to high standards and implement new curricula. Researcher Frederick Hess, a proponent of high stakes accountability, argued that for accountability to have a significant effect on educational quality, "educators must be rewarded or sanctioned on the basis of student performance" (Hess, 2002, p. 73). He recognized that such a system runs counter to the traditional values of the American educational system, which relied on the good will of teachers and the intrinsic motivation of students, but Hess insisted only a coercive accountability system is effective in transforming the quality of public schooling.

Federal Accountability Measures

On January 8, 2002, President George W. Bush signed NCLB which reauthorized the Elementary and Secondary Education Act of 1965 and modified the 1994 reauthorization known as The Improving America's Schools Act (Chapman, 2005). NCLB is based on four basic principles: stronger accountability for results, increased flexibility and local control, expanded options for parents, and an emphasis on methods that have been proven to work (USDOE, 2002). Also with NCLB comes annual testing in the "core" areas of reading, mathematics and science. The law states that by 2005 – 2006, testing is required in reading and math in grades three through eight and once in high school. By 2007 – 2008 testing in science is also to occur at least once in each grade span, three through five, six through nine, and ten through twelve.

NCLB substantially increases the testing requirements for states and sets demanding accountability standards for schools, districts, and states. It does this by requiring each state to set measurable adequate yearly progress (AYP) objectives for all students taken as a whole and for subgroups of students as well. These subgroups are defined to include students from economically disadvantaged families, students from state-identified major racial or ethnic groups, students with limited English proficiency, and students with disabilities.
Each state department of education must certify that its definition of Adequate Yearly Progress presents, "the same high standards of academic achievement to all public elementary school and secondary school students in the state; is statistically valid and reliable; [and] results in continuous and substantial academic improvement for all students" (NCLB, 2001, Sec. 1111 (a)(2)(C)). Furthermore, the AYP definition must include continuous and substantial improvement in both mathematics and reading/language arts, not just for the total group of students considered as a whole, but for each of the specific subgroups (Linn, 2003). In fact, the law requires that 100% of the students pass the state-wide assessments in reading and math

beginning with testing for the year 2013 - 2014. While this final goal is clear and consistent for students in every state, it is important to note that each states' content standards, the rigor of their tests, and the stringency of their performance standards vary greatly (Linn, Baker, & Betebenner, 2002).

NCLB requires each state to have consistent standards for all the students in its public schools. The standards must identify what students should know and be able to do, at each grade level in each affected content area. After establishing the standards, states must also identify, develop, and disseminate high quality, effective curricula aligned to those standards. These curricula, and associated instructional programs, are to be research-based and are to exemplify the current "best practices" for effective instruction. These mandates are intended to reduce variability in educational aims, content, methods of teaching, and measures of achievement. However, as previously noted, there is little consistency in the standards when one compares between states.

NCLB also mandates that all states require public schools to administer statewide assessments in grades three through eight and in high school. The tests must be rigorous, demanding, academic, secular, neutral, and non-ideological (Chapman, 2005). To make Adequate Yearly Progress (AYP), schools must ensure at least 95% of all students and of the students in each subgroup are tested. Perhaps in recognition of the varied assessment measures from state to state, NCLB requires states to participate in NAEP tests in reading and mathematics at grades 4 and 8. NAEP tests are required to help identify states in which standards or state assessments in these subjects are not sufficiently rigorous (Porter, 2002).

The centerpiece of the performance standard aspects of NCLB is the concept of AYP, which is a measurable target for improved test scores in reading, mathematics, and science. There are rewards for schools that meet or exceed the target, and penalties for schools that do not. Scores must be tracked in relation to students' race, ethnicity, gender, socio-economic status, status in special education, and limited English proficiency. In addition, to make AYP, schools must meet and maintain goals in areas such as graduation rate and average daily attendance as well.

The law states that all the required AYP data, along with data on the qualifications of teachers, paraprofessionals, and school safety information, must be made available to the public in a clear easy to read format. AYP data must be summarized for each subject, grade level, school, and subgroup of students. In order to track AYP, report cards must also include retrospective data for at least two years (Chapman, 2005).

The data in these reports flow upward from the district to the state level, then to the federal level. Federal officials report to Congress on degrees of compliance with NCLB (Chapman, 2005), and, although the critical differences make it ill-advised, comparisons between states occur often in the popular media. Pipho (2000) summarized samples of newspaper reports of state-wide assessment results in Massachusetts, Texas, California, and Colorado. Reporters' accounts included accusations in Boston of teachers cheating to improve their students' test scores, and the California Department of Education ranking its school districts which led to debates on opportunities in the affluent versus socio-economically disadvantaged systems throughout the state.

Impact of State and Federal Accountability Measures

While the use of high-stakes testing is becoming more common, the overall picture of state testing programs remains quite varied. The research conducted on the implementation and impact of state testing systems reflects this interstate and intrastate variability. State studies have been largely unsystematic and have involved testing programs with different stakes levels for students and schools or different testing formats such as multiple-choice or performance-based. The research has also been inconsistent with regard to the grade level and content area at the focus of the study. However, even though studies have used different methodologies, they have generally been consistent with regard to the topics of interest. For example, the majority have concentrated on the effects of these tests on instruction, with a focus on what is taught, how it is taught, and how it is assessed. Research efforts have also typically examined the role of test preparation and the relationship between the state test and the content standards (Pedulla, et. al, 2003; National Board on Educational Testing and Public Policy (NBETTP), 2003).

A growing body of evidence suggests that high-stakes testing can be a driving force behind fundamental change within schools (Koretz, Linn, Dunbar, & Shepard, 1991; Hoffman et. al., 2001; Taylor et al., 2003). However, there is a difference of opinion as to whether this change carries a positive or negative impact. For example, while some feel that the granting of rewards or the threat of sanctions is essential for promoting quality teaching and encouraging higher student achievement, others have found that high-stakes testing limits the scope of classroom instruction and student learning in undesirable ways (Stecher & Barron, 1999; Stecher, Barron, Chun, & Ross, 2000; Wright, 2002).

Another of the criticisms of high-stakes testing is that the emphasis on minimal competency levels for students results in schools teaching directly to these minimal competencies rather than the broader curriculum (Sloane & Kelly, 2003). Koretz et.al. (1991 p. 16) concluded that "our results raise serious concerns about the effects of high-stakes testing on instruction. The past several years have seen continuing debates about appropriate and inappropriate teaching to the test. Skeptics about test-based accountability, including several of us, have suggested that undesirable narrowing of instruction is one likely consequence of high-stakes testing." On the other hand, supporters of test-based accountability, argue that focusing on the content of the test is desirable, as long as test-based accountability causes teachers to concentrate on broad areas of knowledge and skills measured by the test instead of content specific to the test question. Regardless of one's position on this issue, it is difficult to deny that statewide testing policies influence classroom instruction and student learning (Abrams et al., 2003).

Research on the Effects of Test-Based Accountability

Many research studies have investigated the effects of state-mandated testing programs, particularly those with high stakes attached to the test results for schools, teachers, and students (Abrams & Madeus, 2003). The majority of these studies gathered information from teachers and administrators by using surveys, interviews, classroom observations, and various other combinations. Most tended to focus on a single state, and, given the varied nature of state testing programs in terms of the format, grade level, and subject areas tested, it seems that the research on the effects of these programs yields both positive and negative results.

Herman (2004) summarized major themes in recent research to provide a picture of how these new assessment systems are working and the extent to which they are working as intended, in the sense of encouraging good teaching and learning and promoting progress toward students achieving the standards. She concluded that teachers pay attention to what is tested; teachers model test content and pedagogy; and non-tested content gets short shrift.

Attention to What Is Tested

Much of the research on state testing programs addresses their effects on what is taught and that teachers pay attention to what is tested and adapt their curriculum and teaching accordingly. For example, of the 722 Virginia teachers surveyed by McMillan et al. (1999), more than 80% indicated that the state *SOL* test had impacted their instruction, particularly with regard to the content focus of daily lessons. Overall teacher responses led the researchers to conclude that, "teachers are placing greater emphasis on covering the content of the *SOL*" (p. 10). In another example, Lane, Stone, Parke, Hansen, & Cerrillo (2000), in a survey of a representative sample of Maryland elementary and middle schools, found teachers and principals reporting that the Maryland State Performance Assessment Program (MSPAP) was having substantial impact on curriculum and instruction in reading and mathematics. The researchers' composite index of MSPAP impact, including teachers' responses to the overall influence of MSPAP on classroom activities, its influence on subject area instruction and assessment, and teachers' use of MSPAP-type problems, showed at least moderate impact (means of 2.8 to 3.3 out of a possible 4) across the two subject areas and school levels.

A statewide study in Washington State by Stecher et al., (2000) of the education reform there also reflected the seriousness with which educators respond to testing. One hundred percent of the principals surveyed indicated they had developed school-wide plans for improving performance on the Washington Assessment of Student Learning (WASL) and implemented test preparation activities. Nearly three quarters of the same principals indicated that they had instituted school-wide policies to address curriculum gaps revealed by the test.

At the classroom level, Stecher et al., found nearly two thirds of surveyed elementary school teachers reported that the WASL had a moderate or great effect on their teaching of writing and three quarters reported a moderate or great effect on their teaching practices in mathematics. These findings compliment earlier studies in Kentucky that found principals strongly encourage teachers to focus their instruction on the content and skills likely to be on the Kentucky Instructional Results Information System (KIRIS). Teachers reported an increase in the match between the content of their instruction and that of the assessment (Koretz et al., 1996a).
As a possible negative impact, some research finds the concentration on tested content areas often comes at the expense of content domains that are not assessed, such as science, history, geography, and the arts (Taylor et al., 2001). In some cases, the increased attention toward content that is tested has led to a decreased emphasis on curricular areas that are not measured under the assessment program. For example, a study in Arizona indicated that teachers did not place as much emphasis on non-tested subjects such as social studies and science (Smith et al., 1991). Similarly, in Kentucky, 87% of teachers surveyed agreed that the KIRIS had "caused some teachers to de-emphasize or neglect untested subject areas" (Koretz et al., 1996a, p. 41). Teachers in North Carolina reported similar results (Jones, Jones, Hardin, Chapman, Yarbrough, & Davis, M, 1999). Stecher & Hamilton (2002, p. 4) concluded that "we are likely to see more

emphasis on tested subjects and less emphasis on non-tested subjects. Our research has clearly demonstrated that teachers shift classroom time toward the subjects that are tested at the expense of those that are not." In another study, Hoffman et al., (2001) surveyed teachers about the impact of the Texas Assessment of Academic Skills (TAAS). In their findings (p. 489), they reported that there is "considerable curriculum displacement due to TAAS because 85% of the teachers replied that 'if it's not being tested, it's not being taught'."

It is in recognition of the potential to narrow the curriculum to those content areas that are tested that some accountability systems have sought to include a wide range of content areas. According to the Kentucky Department of Education, their accountability system, for example, includes tests at selected grades in seven content areas: reading, writing, mathematics, science, social studies, arts and humanities, and practical living/vocational studies (Linn, 2003). Concerns about overemphasis of tested subjects at the expense of other subjects also explains why several states have found that science, history, or art teachers are eager to have the state include tests of their subjects in the state accountability system. Including tests in a subject area in the accountability system is certainly not the only way to assure adequate attention will be given to the subject, but including tests of the subject is seen as one way of increasing attention given to the subject (Linn, 2003).

Teaching What Is Tested

Research shows that in addition to modifying their classroom curriculum and instruction to include the content of what is tested, teachers tend to model the pedagogical approach represented by the test (Koretz et al., 1991; Hoffman et al., 2001; Wright, 2002). Thus, when a large-scale assessment is composed of multiple-choice tests, teachers tend to use multiple-choice worksheets in their practice, but when the assessments use open-ended items and/or extended writing and rubrics to judge the quality of student work, teachers incorporate these same types of activities in the classroom work (Herman, 2002). A study of Vermont's statewide portfolio assessment, for instance, found more than 80% of elementary school teachers reporting an increase in the amount of class time they devoted to teaching problem solving due to the assessment (Koretz, Stecher, & Deibert, 1992). Similarly, because the assessment also stressed communication, in the same study, more than two-thirds of the teachers reported having their students spend somewhat more time than in previous years writing reports about mathematics, and more than 60% assigned mathematics applications required by the portfolios at least weekly. Subsequent studies in Kentucky also had teachers reporting that that state's innovative assessment system stimulated teachers to focus more on tested subjects and to increase the use of instructional practices intended by the test reformers (Stecher et al., 1998).

Studies in Maine and Maryland support these findings. Firestone, Marmosets, and Fairman (1998) found teachers added the types of problem solving tasks the teachers expected to be on the statewide assessment to their curriculum. In the Maryland study, these were extended projects that asked students to apply math concepts, to reason mathematically, and to use multiple forms of representation.

Teaching How It Is Tested

Most apparent in direct test preparation activities is the match between test format and instructional format. The intent is to give students practice drills specifically designed to mirror

the given assessments, with the explicit purpose of familiarizing students with the test format and thus enabling them to do better on the test. These practice activities are usually generated from sample items and practice materials provided by the state or district and from commercially available materials developed by test publishers.

The nature and extent of this test preparation varies considerably from study to study. In a case study of Arizona elementary schools, Smith, Edelsky, Draper, Rottenburg, and Cherland (1990) found that, as teachers directly prepared their students for the coming test in the several weeks prior to the mandated standardized test period, regular curriculum virtually shut down in some schools. Smith and colleagues saw this as an obvious interruption and detraction from regular instruction.

The Stecher et al., (2000) Washington study explicitly documented how time spent in test preparation may vary with the time of the year. The researchers found that teachers increased the amount of time they spent in direct preparation for the WASL as the spring testing window approached. In November, about one half of the teachers reported spending 1 to 2 hours a week preparing for the WASL, and about a quarter reported spending no time at all in test preparation. As the testing dates approached in April, however, one-third of fourth-grade teachers and one fifth of seventh-grade teachers reported spending more than 4 hours per week preparing for the test, and less than 10% reported spending no time on test preparation. Similar results were found in Washington for writing teachers.

Firestone et al., (2000) uncovered a similar pattern of increased attention to test preparation just prior to testing in New Jersey and noted sizeable socioeconomic differences in such practices as well. Teachers from schools in high-poverty districts reported substantially more time devoted explicitly to test preparation activities than those in wealthy districts (Herman, 2004).

Time Allocation for Tested Subjects

The fact that teachers may pay more attention to the tests than to the standards and/or curriculum frameworks that underlie them is also reflected in how teachers report on their use of instructional time. In Kentucky, Stecher and Barron (1999) examined how teachers at different grade levels allocated classroom time as a function of what was tested on the now defunct KIRIS. The results indicated that the amount of time teachers worked with students in a subject each week seemed to be highly related to whether the subject was tested at that grade level. Teachers shifted their use of curriculum time from one grade to the next as fourth-grade students spent an average 16.2 hours per week engaged in reading, writing, and science, which were the subjects tested by KIRIS. This was compared to the 12.2 hours that fifth-grade students spent on the same subjects. In contrast, fifth-grade students on average studied for 16.8 hours per week in mathematics, social studies, arts and humanities, and practical living/vocational education, which were the subjects assessed by KIRIS, as compared to only 11.3 hours per week for fourth graders. Combined across subjects, this represented a sizeable shift in curricular time. In responses to open-ended items on the survey, teachers stated that KIRIS was the reason why they reallocated their use of time.

Similarly, when Stecher et al., (2000), looked within subjects to see what teachers were teaching relative to what was tested, they found different patterns by grade level. The researchers

concluded that, although standards are supposed to be continuous across grade levels, teachers tended to teach more extended writing skills and to address a greater portion of writing objectives in tested grades than in those grades that did not participate in the writing portfolio assessment. In mathematics, there were similar findings where teachers tended to cover a greater number of math topics when students in their grade level were assessed. However, Borko's (Stecher & Borko, 2002) case studies of exemplary sites in the same state suggest that the picture of test-focused curriculum may not be as bleak as Stecher et al.'s (2000) findings suggest. At these schools, principals and teachers paid close attention to test results and analyzed them class by class, then used them to help identify curriculum strengths and weaknesses, but the analysis was a point of departure for reflecting on practices and identifying concrete ways to improve instruction (Herman 2002).

Impact on Non-Tested Content

A focus on the test rather than the standards also means that what gets tested gets taught, and what does not get tested may get less attention or may not get taught at all (McMillan et al., 1999; Taylor, et al., 2001; Stecher & Hamilton, 2002; Sunderman et al., 2004). The Stecher et al., (2000) survey data from their Washington study again provides a strong case. Teachers increased the time they spent on tested subjects at the expense of non-tested subjects and attributed the cause of these changes to WASL. Again, this study mirrors earlier findings from Kentucky, where the great majority of teachers agreed that because of KIRIS, they were de-emphasizing or neglecting content that was not on the test (Koretz, et al., 1996a). Wright (2002 p. 28) in his study of inner city elementary schools in California concluded that "the SAT-9 tests only language arts and math, there is no room for science, social studies, PE, music and art." In addition, Sunderman et al. (2004 p. 4) found that, "Teachers confirm that the NCLB accountability system is influencing the instructional and curricular practices of teachers, but it is producing unintended and possibly negative consequences. They reported that, in response to NCLB accountability, they ignored important aspects of the curriculum, de-emphasized or neglected untested topics, and focused instruction on the tested subjects, probably excessively." The findings thus suggest that teachers and schools may focus excessively on what is tested to the neglect of both the broader domain of the tested discipline and important subjects that are not tested. On the other hand, this focus on the test may represent little problem if the state or district assessment instrument represents a well balanced picture of its standards.

In Virginia, however, the excessive focus on NCLB core subject areas over the non-core content was realized as the *SOL* assessments for computer/technology were removed from the state testing program. In a Superintendent's Memo (No. 128) dated September 27, 2002, then Virginia state superintendent, Jo Lynne DeMary, informed local school divisions that beginning with the fall 2002 administration of *SOL* testing the computer/technology examinations would no longer be given. The memo did state, however, that "although computer technology will no longer be assessed, the computer technology standards remain in effect. Teachers should continue to provide instruction in the content of the standards when appropriate."

While teachers may well continue to "provide instruction in the content of the standards when appropriate," there is concern that high stakes testing may have the unintended consequence of pressuring teachers to make decisions that narrow the curriculum in non-tested areas like

computer/technology. In view of the fact this study was focused on knowledge of technology, the research in the field suggested another topic of interest – the "digital divide."

Digital Divide

The term digital divide refers to the perceived gap between those who have access to the latest technologies and those who do not. Underlying this concept is the notion that since this can be considered the Information Age, those not having access to information through the latest technologies are considered to be disadvantaged. According to Benjamin Compaine in his book, *The digital divide: Facing a crisis or myth?*, the idea of a digital divide received large amounts of media attention after the second National Telecommunications and Information Administration (NTIA) survey was titled "Falling Through the Net II: New Data on the Digital Divide." in 1998. The term was then used to describe those who had a personal computer and a modem and those who did not (NPEC, 2004).

Currently the term has become part of the vernacular regarding technology "haves" and "have-nots" in public education. While there are several dimensions to the digital divide, for the purpose of this research it was useful to separate the concept into two basic categories: (1) household and individual digital divide—which refers to children; and (2) institutional digital divide—which refers to public schools.

The Department of Commerce (DOC) (2002) examined the issue of household and individual digital divide in "*A Nation Online: How Americans Are Expanding Their Use of the Internet,* the Department of Commerce (DOC) (2002). In that study the DOC found that family income remains an indicator of whether a child uses a computer or the Internet. Individuals who live in high-income households are more likely to be computer and Internet users than those who live in low-income households. This relationship has held true in each successive survey of computer and Internet use conducted by the DOC.

However, both computer and Internet use have increased steadily across all income categories over time. While notable differences remain in Internet use across income categories, Internet use has grown considerably among people who live in lower income households. For persons living in the lowest income households (less than $15,000 annually), Internet use had increased from 9.2 percent in October 1997 to 25.0 percent in September 2001 (DOC, 2002).

Internet use is also growing faster among people in lower family income brackets. Internet use among people who live in households where family income is less than $15,000 grew at an annual rate of 25 percent between December 1998 and September 2001. Over the same period Internet use grew at an annual rate of 11 percent among people living in households where family income was $75,000 or more (DOC, 2002).

Not only did the Internet use rate grow faster for those living in lower income households from September 1998 to September 2001, but growth accelerated again between August 2000 and September 2001. This acceleration in the growth of Internet use did not occur among people living in higher income households (NPEC, 2004). Thus, it can be argued that by these measures the digital divide has been shrinking in the recent past.

This idea of a closing divide is also supported by a Kiser Family Foundation Study (March 2005) which found the majority of young people from each of the major ethnic and socio-economic groups now have Internet access at home, and the increase from 1999 has been higher among children from lower socio-economic levels. The report further cited that over the past five years there had been an increase of nearly 40 percentage points in home access among children whose parents had a high school education or less (from 29% to 68%), compared to an increase of just under 20 percentage points among those whose parents had a college or graduate degree (from 63% to 82%).

However, the Kiser Report (March 2005) also found that gaps between young people of different socio-economic groups remained significant. For example, while 54% of kids going to school in communities where the median income was less than $35,000 a year went online in a typical day, 71% of those from communities where the median income was greater than $50,000 a year did.

Regarding the issue of the institutional divide, the National Center for Education Statistics (NCES) has been tracking the degree to which students are exposed to computers and the Internet while attending grades K-12 since 1994, when the White House's National Information Infrastructure (NII) initiative challenged the nation's schools and classrooms to connect to the Internet by the year 2000. The most recent survey indicated that the percentage of public schools connected to the Internet had increased each year, from 35 percent in 1994 to 98 percent in the fall of 2000. It is important to note that by 2000, all schools, regardless of level, poverty concentration, and metropolitan status, were equally likely to have Internet access (NPES, 2004).

Looking at classrooms within schools, in 1994, only 3 percent of U.S. public school instructional rooms were Internet connected. By 2000, 77 percent were connected, but differences by school characteristics remained. Sixty percent of classrooms had Internet access in schools with high concentrations of poverty (75 percent or more students eligible for free or reduced-price lunches), compared to 77 to 82 percent of classrooms in schools with lower concentrations of poverty. These continuing differences notwithstanding, the percentage of instructional rooms with Internet access increased between 1999 and 2000 in these schools from 38 to 60 percent in schools with the highest concentration of poverty (NCES, 2000).

The issue of institutional access, in this case access at school, is ever more significant when a student has limited access at home. Most "outside home" use is at schools, where children use computers and the Internet at high levels. A US Department of Commerce study (2002) showed the significance of having computers at school in bringing technology to children of various backgrounds. The researchers found that 80.7 percent of children (ages 10-17) in the lowest income category used computers at school, which differed only slightly from the 88.7 percent of children at the highest income level. It would seem that school helps to equalize the disparity that would otherwise exist in computer and Internet use among the various household income categories. The study found that in the lowest income category, 33.1 percent of children used computers at home, in contrast to 91.7 percent of children in the highest income category. When home and school are combined, however, the gap in children's computer use is reduced from nearly 60 percentage points to12 points between the highest and lowest income.

Making the Internet accessible outside of regular school hours allows students who would not otherwise have the opportunity to have access to the Internet for school-related activities like homework. In 2000, over half (54 percent) of public schools with access to the Internet reported that computers with access to the Internet were available to students outside of regular school hours. Secondary schools were more likely to provide this service than elementary schools (80 percent compared to 46 percent It is important to note that equal access to technology is not the same as equal access to equal technology (NPEC, 2004).

So, even though there have been significant improvements in recent years in both household/individual access and institutional computer availability, there is ample evidence that a digital divide still exists between lower SES students and their peers, and the majority of these lower SES students rely on schools for both computer technology and Internet access (Eamon, 2004; NPEC, 2004; Patrick, 2004). There is also evidence that schools do appear to help narrow the digital divide in terms of computer use since differences in the rates of computer use are smaller at schools than they are at home when such characteristics as family income and parental education are considered (Department of Commerce (DOC), 2002; DeBell, M. & Chapman, C., 2003).

Impact on the Digital Divide

Literature investigating the digital divide suggests that teachers can influence access and instructional opportunities that students have with educational technologies and that there are practical steps all educators can take toward decreasing the digital divide (Swain, C. & Pearson, T., 2003). The implementation of technology standards, such as the Virginia *C/T SOL*, may have facilitated or served as a catalyst in this process.

Various initiatives exist at the national, state, and local levels to incorporate technology standards requiring all students to perform at high levels while engaged in challenging curriculum. For instance, The International Society for Technology in Education launched the National Educational Technology Standards (NETS) Project during the 1990s to develop standards for students, teachers, and administrators. The International Technology Education Association developed the Standards for all Americans Project and produced *Standards for Technological Literacy: A Content for the Study of Technology* in 2000. Some believe a standards-based curriculum and assessment for technology would level the playing field for all students by expecting all to perform at high levels (Swain & Pearson, 2003). In contrast and as mentioned previously, the Virginia Department of Education chose to keep its *C/T SOL* in place, but removed the assessment component.

The implementation of the *C/T SOL* may well impact the digital divide. However, the effect of increased pressure from NCLB for students to perform well on "core" *SOL* exams in Virginia, coupled with the removal of the state assessments in computer/technology in 2002, provides a case to examine evidence of a possible de-emphasis on "non-core" subjects. If a tendency to narrow the curriculum exists, it might result in a lesser quality and quantity of instruction and, therefore, less student achievement in the computer/technology content area. Further, if there is lesser quality and quantity of instruction in computer/technology content at school, it might result in even less student achievement in that content for lower SES students as compared to their peers and, therefore, further widening the "digital divide."

National Study of States – Mandated Testing Programs

Given the increasing reliance on state testing programs to determine high school completion and the large number of students affected by these policies, the need for more research on how the consequences of state-mandated testing programs affect instruction and learning across the nation was undertaken by the National Board on Educational Testing and Public Policy (NBETPP) in 2003. The purpose and focus of the NBETPP survey was to collect information from ordinary classroom teachers who witness the effect of state-mandated testing firsthand. According to the survey administrators, teachers are charged with implementing testing programs and policies but often have little influence on their formulation. By gathering the opinions of teachers nation-wide on high stakes testing and its impact on teaching and learning, the study aimed to give voice to those are affected by the results but only marginally involved in the processes that lead to statewide testing programs (Pedulla, 2003).

Of the 12,000 teachers who received the national survey, 4,195 returned useable surveys, yielding a response rate of 35%. Surveys were received from every state sampled (Iowa, Oregon and Idaho were excluded from the sample). The teachers varied widely with respect to personal characteristics and professional experience (Pedulla, 2003).

The NBETPP (2003) final report claims that state education policymakers have a long history of instituting testing programs in response to concerns about the quality of education students receive. Tests have consistently been viewed as a lever to change classroom practices and produce overall improvement in general education. The current emphasis on high-stakes testing resulting from standards-based reform efforts is largely an extension of three decades of testing, with a new emphasis on higher standards and greater academic achievement.

How the consequences attached to state test results affect instruction and student achievement has been the focus of substantial research. Generally, this research has found both positive and negative effects of state testing programs, particularly those with high stakes attached (Koretz et al., 1991; Hoffman et. al., 2001; Taylor et al., 2003). While the use of high-stakes testing is becoming more common, the landscape of state testing programs is quite varied. The research conducted by the NBETPP on the implementation and impact of state testing systems reflected the cross-state variability. State studies have been largely unsystematic and have involved testing programs with different stakes levels or testing formats (i.e. multiple-choice or performance-based). Research at the state level has also been inconsistent with regard to the grade levels and content areas included in the studies (Pedulla, 2003).

Instrumentation

The instrument used for the NBETPP nationwide survey of teachers attempted to address the interaction between the stakes attached to the state test results and perceived impacts on teaching and learning. The focus of the survey items and the process used to select teachers enabled the researchers to look critically at the relationship between school and student levels of accountability. Examples of items that the survey instrument focused on were the impact of testing on the content and mode of instruction, test preparation, and pressure on teachers (NBETPP, 2003).

Items on the nation-wide survey regarding the impact on classroom instruction dealt with changes in the amount of time spent on a variety of activities and with the influence of the testing program on pedagogical practices and instructional emphasis. In general, the survey found that the influence of state testing programs on teachers' instructional practices is more closely related to the stakes for students than those for schools. The items clustered into 3 scales: (1) impact on tested subject areas, (2) impact on non-core subject areas, and (3) impact on student and class activities. More teachers in states with high stakes for students than in states with lesser stakes indicated that they spent more time on instruction in tested areas and less on instruction in non-core subject areas (e.g. fine arts, physical education, foreign languages, industrial/vocational education) and on other activities (e.g. field trips, enrichment activities).

NBETPP Survey Findings

Instructional Time for Tested Content

According to the NBETPP (2003) report, the impact of testing programs is generally stronger in elementary and middle schools than in high schools as evidenced by the fact that more elementary and middle school teachers than high school teachers reported that they increased the amount of time spent on tested areas and decreased the time spent on non-core subject areas and on other activities. Across all types of testing programs, teachers reported increased time spent on subject areas that are tested and less time on areas not tested. They also reported that testing has influenced the time spent using a variety of instructional methods such as whole-group instruction, individual-seat work, cooperative learning, and using problems similar to those on the test. State studies again support these findings on the national survey. For example, Sunderman et al.(2004, p. 5), in their study of Virginia and California teachers, concluded "our survey results confirm that the NCLB accountability system is influencing the instructional and curricular practices of teachers, but that it is producing unintended and possibly negative consequences. Teachers believed that both sanctions and the AYP requirements cause them to ignore important aspects of the curriculum."

Teachers on the national survey also responded to a series of items related to preparing their students for the state-mandated test (e.g. on test preparation methods used and amount of time spent on test preparation). Teachers in states with high-stakes tests were much more apt than their counterparts in states with lower-stakes tests to engage in test preparation earlier in the school year; spend more time on such initiatives; target special groups of students for more intense preparation; use materials that closely resemble the test; use commercially or state-developed test-specific preparation materials; use released items from the state test; and try to motivate their students to do well on the state test. Teachers in high-stakes states were more likely to report that they focused test preparation on students who were on the border either of passing or of moving to the next performance level.

Elementary teachers in high-stakes states reported spending more time on test preparation than did their high school counterparts. Further, elementary teachers were more apt to report engaging in test preparation throughout the year than were middle or high school teachers. Elementary teachers in states with high stakes for schools and students were twice as likely as teachers in the low-stakes states to report that their test preparation content was very similar to the content of the state test.

State studies provide supportive data for these findings. Moon et al., (2003 p. 55) in a survey of California, Texas, and Virginia teachers, concluded that "content delivered to students also seems to be directly affected by the state testing pressure. Subjects not included in the state tests often were accorded low priority for most of the school year to create larger blocks of instruction for tested subjects and skills. Acknowledging this emphasis, some teachers articulated concern for the long-term detrimental effects for the students, particularly for the most capable learners."

Pressure to Teach Tested Content

Items related to pressure on teachers in the national survey dealt with pressure from administrators and parents to improve test scores, and pressure to limit teaching to what is tested and to change teaching methods in ways that are not beneficial. In general, teachers in high-stakes states reported feeling more pressure than those in lower-stakes states. However, regardless of the consequences attached to the state test, teachers reported similar feelings of pressure from parents to raise test scores.

Research from state surveys supports the national findings that teachers respond to the pressure to improve scores on their state test, particularly in high-stakes settings, by spending more classroom time preparing students specifically for the state test. In Maryland, 88% of teachers surveyed felt they were under "undue pressure" to improve student performance on the state test (Koretz, Mitchell, Barron, & Keith, 1996b). An even larger proportion of Kentucky teachers (98%) responded similarly when asked the same question (Koretz et al., 1996a).
A large majority of teachers felt that there is so much pressure for high scores on the state-mandated tests that they have little time to teach anything not covered on the tests. This view was most pronounced in states where high levels of accountability are demanded of districts, schools, teachers, and students. Research at the state level suggests an increased emphasis on test preparation is one of the possible outcomes of the pressure teachers feel to improve student performance. Of 470 elementary teachers surveyed in North Carolina, 80% indicated that "they spent more than 20% of their total instructional time practicing for the end-of-grade tests" (Jones et al., 1999, p. 201).

Similarly, a survey of reading teachers in Texas revealed that on average teachers spent 8 to 10 hours per week preparing students for the Texas Assessment of Academic Skills (TAAS) (Hoffman et. al., 2001). The most common test preparation activities reported by Texas teachers included demonstrating how to mark the answer sheet correctly, providing test-taking tips, teaching test-taking skills, teaching or reviewing topics that would be on the test, and using commercial test-preparation materials and tests from previous years for practice (Hoffman et al., 2001. p. 6).

This finding also supports the contention that state testing programs have the effect of narrowing the curriculum. Also, teachers in high-stakes states were more likely than those in low-stakes states to report that they feel pressure from the district superintendent, and to a lesser degree from their building principal, to raise test scores. While most teachers reported such pressure, it was significantly lower for those in low-stakes than in high-stakes states. Between 3 in 10 and 4 in 10 teachers in high-stakes states compared with 2 in 10 of their counterparts in low stakes states reported that teachers at their school want to transfer out of the tested grades.

Generally, elementary teachers in the national survey reported feeling more pressure than high school teachers, while middle school teachers were somewhere in between. Further, elementary and middle school teachers in states with high stakes for districts, schools, teachers, and students reported the greatest feelings of test-related pressure as compared with their counterparts in other testing programs. A substantial majority of teachers at each grade level indicated that state testing programs have led them to teach in ways that contradict their ideas of sound instructional practices; this view was particularly pronounced among elementary teachers. This finding highlights the fact that state testing programs can have unintended negative effects (Pedulla, 2003).

Summary

Perhaps as a result of the concerns engendered by *A Nation at Risk*, state policymakers in every state but Iowa developed educational standards and every state but Nebraska implemented assessment policies to check those standards (Quality Counts, 2001). In many states, including Virginia, high-stakes, or serious consequences, were attached to tests in order to hold schools, administrators, teachers, and students accountable for meeting the newly imposed high standards. By affixing high-stakes to assessments, policymakers borrowed principles from the business sector and attached incentives to learning and sanctions to poor performance on tests. High performing schools would be rewarded. Underperforming schools would be penalized, and, to avoid further penalties, they would implement strategies to improve assessment results. Accordingly, and in theory, students would be motivated to learn, school personnel would be forced to do their jobs, and the condition of education would inevitably improve. What made sense, in theory, gained widespread attention and eventually increased in popularity as a method for school reform.

Numerous studies support the notion that high stakes testing affects the delivery of instruction and narrows the curriculum. Linn (2003) reported there is ample evidence to suggest that the arts and humanities, vocational education, and other electives are being neglected in support of instruction in the high stakes testing "core" areas of reading, math, science, and social studies. Rottenberg and Smith (1990) conducted an 18-month observational study of testing effects in two schools in Arizona. In their key findings, the authors concluded that external testing reduces the time available for ordinary instruction. In addition, they found that in high stakes environments schools neglect material that the external tests do not include. More recently researchers in a Colorado study (Taylor et al., 2003 p. 24) reported that "when asked if they had made any changes in their classroom instruction because of the standards, 86.9% of the teachers replied 'yes' and 13% said 'no.' The two most frequent changes teachers reported were aligning curriculum with the standards and adding something to the curriculum because of the standards."

Surveys have also been conducted which suggest that teachers are "teaching to the tests" and addressing only those topics they feel will be assessed by the annual standards of learning exams (Moon, et al., 2003). Herman and Golan (1990, 1993) sought to determine whether accountability pressures drive schools to narrow their curriculum at the cost of broader student learning. Survey methodology was used with upper elementary school teachers in 11 medium-to-large school districts in nine states. The authors concluded that testing substantially influenced teachers' instructional planning. Specifically, teachers reported devising instructional plans that

included all or most of the test content and test objectives. In addition, teachers reported adjustment of the curriculum sequence based on what was included on the tests.

Shepard and Dougherty (1991) built their study based on the findings of Herman and Golan (1990). Again, using a teacher questionnaire focusing on perceptions of the influences testing had on teaching; they surveyed third through sixth grade teachers in two high-stakes districts. The authors reported that 75% of the teachers would give greater emphasis to basic skills instruction, vocabulary lists, word recognition skills, and paper-and-pencil computation than they would if there were no mandated tests. Further, content that was not a focus of the tests received the lowest priority. Fifty percent of the teachers reported giving less emphasis to subjects that were not tested (e.g., science or social studies).

In a Virginia survey of teachers, McMillan et al., (1999 p. 6) reported that, at the elementary level in particular, 78% of the teachers indicated that the *SOL* had "somewhat" or "extensive" impact on their instruction and assessment. They also reported that "many teachers mentioned accountability and pressure."

In the same study, McMillan et al., indicated that written comments on the survey instrument from secondary teachers appeared to fall in one of three categories: changes in what content is taught, changes in how the content is taught, and changes in classroom assessments. The researchers concluded that, "The most common comment emphasized the need to change so that sufficient time and attention could be devoted to the *SOL* to ensure adequate coverage of the content that was to be tested. There was clearly 'pressure' to check to make sure of coverage, often at the expense of teaching content that did not match well with the *SOL*" (p. 8).

The National Board on Educational Testing and Public Policy (NBETPP, 2003) conducted a national survey of teachers which found that in states with high stakes testing and accountability measures for students and teachers, larger numbers of teachers reported spending more time on instruction in tested areas and less on instruction in non-core subject areas (e.g. fine arts, physical education, foreign languages, industrial/vocational education) and on other activities (e.g. field trips, enrichment activities).

The NBETTP (2003) study also found that the influence of the test is greater as the stakes increase, with 40 percent of teachers in high stakes states, such as Virginia, reporting that the tests influence their teaching on a daily basis (Lewis, 2003). Teachers in high stakes testing situations felt more pressure to have their students perform well, and therefore, more closely aligned their teaching with the test (Berube, 2004).

If these patterns hold true in Virginia, then the increased emphasis on reading, math, and science caused by NCLB, coupled with the high-stakes *SOL* tests, may have caused teachers to make choices on the allocation of instructional time spent on areas that are assessed by the state exams. Their decisions may also be accompanied by a decrease in instruction in other areas, including computer/technology content.

Since there is ample evidence that a digital divide still exists between lower SES students and their peers, and the majority of these lower SES students rely on schools for both computer

technology and Internet access (Eamon, 2004; NPEC, 2004; Patrick, 2004), the resultant decrease in instruction in computer/technology may have a greater adverse effect on low SES student achievement.

CHAPTER III: METHODOLOGY

Introduction

In 1995, the Virginia Board of Education established state-wide *Standards of Learning* (*SOL*) in the areas of English, math, social studies, science, and computer/technology. Beginning in 1998, cumulative exams were administered once each year in the four core content areas to students in grades three, five, and eight. *C/T SOL* were tested at the end of fifth and eighth grades.

In a Superintendent's Memo dated September 27, 2002, then Virginia state superintendent, Jo Lynne DeMary, informed local school divisions that beginning with the fall 2002 administration of *SOL* testing the computer/technology examinations would no longer be given. The memo did state, however, that "although computer technology will no longer be assessed, the computer technology standards remain in effect. Teachers should continue to provide instruction in the content of the standards when appropriate."

There is simple saying that "what gets measured gets done." The No Child Left Behind Act of 2001 makes high stakes testing more pervasive than ever before with requirements to expand testing for reading and math throughout the country to annual assessments in grades three through eight. In addition, the consequences of a school not making Adequate Yearly Progress (AYP) increase significantly with time as do the AYP targets themselves.

This study attempted to address some of the issues outlined in the review of the literature. In general, are national policy decisions related to standards testing and accountability having an effect on what content is taught in schools? If so, could it be that there are unintended consequences for non-tested content, such as the narrowing of the curriculum suggested by some of the literature (Hoffman, et. al, 2001; Pedulla, et al., 2003)?

More specifically, with these increasing pressures, might teachers and schools in Virginia and elsewhere perceive a narrowing of the curriculum and thereby accord less attention to other *SOL* that are not being assessed? As a possible case in point, given that the state assessment has been suspended, are these pressures resulting in a decreased emphasis on the *C/T SOL* and, therefore, in lower levels of knowledge and skills in this content area?

Teacher Perceptions

Research Questions

This study investigated a number of issues raised separately by several previous studies, looking particularly at teacher perceptions of the effects of high stakes testing on their decisions regarding the curriculum and the subsequent impact on teaching and learning processes in schools (Taylor et al., 2003; Kubow & Debard, 2000; Herman & Golan, 1998). Some evidence suggests that teachers in different school levels (elementary, middle, and high school) have varied perceptions of the classroom effects of high-stakes testing accountability (Kubow & DeBard, 2000); therefore, school levels were considered in relation to the research questions. Additionally, because there is some evidence to suggest that teachers and students located in schools with various income-levels are affected differently by the current accountability

programs, the questions for research were considered in terms of whether teachers perceived they taught high, middle, or low numbers of students who qualify for free and reduced price lunch (Hoffman et al., 2001; Kubow & DeBard, 2000; Paris, Lawton, Turner, & Roth, 1991). Finally, the assumption was also made that the perceptions of teachers who taught prior to the implementation of *SOL* testing in 1998 might differ from those who have taught only under the current assessment program.

Following Creswell's (1994) recommendation for conducting exploratory research, this study was organized in terms of research questions rather than stated hypotheses. Research questions one through eight pertain to teachers' perceptions and questions nine through fourteen concern the impact on student learning. The questions for research were as follows:

1. What do teachers in a Virginia mid-size urban school division in perceive are the effects of high stakes *SOL* testing on their classroom instruction?

2. How much and from where do these teachers feel pressure to improve their students' test scores?

3. Do teachers in the school division perceive that the *Computer/Technology SOL* are still being taught despite no longer being assessed by the Virginia Department of Education?

4. Do teachers in the school division perceive that fifth and eighth grade students in the 2004 – 2005 school year know more, less, or about the same amount of *Computer/Technology SOL* content as did their peers from three years ago?

5. Do teachers in the school division perceive that fifth and eighth grade students in the 2004 – 2005 school year who qualified for free and reduced price lunch know more, less, or about the same amount of *Computer/Technology SOL* content as did their peers from three years ago?

6. Do elementary level teachers have different perceptions regarding the previous research questions than did middle level teachers?

7. Do teachers with teaching experience prior to the implementation of *SOL* testing in 1998 have different perceptions regarding the previous research questions than did those with teaching experience only under the current assessment program?

8. Do teachers with perceived high levels of lower socio-economic status students have different perceptions regarding the previous research questions than did those with perceived middle or low levels of lower SES students?

Impact on Learning

Research Questions

9. Do fifth and eighth grade students in a mid-size urban school division in the spring of 2005 know more, less, or about the same about computer/technology than did students did in the spring of 2002, as measured by raw scores on the 2002 version of the Virginia *Computer/Technology SOL* assessment instruments?

10. Do the 2002 fifth and eighth grade students in the school division who qualified for free and reduced price lunch know more, less, or about the same about computer/technology as did their grade level peers?

11. Do the 2005 fifth and eighth grade students in the school division who qualified for free and reduced price lunch know more, less, or about the same about computer/technology as did their grade level peers?

12. Do the 2005 fifth and eighth grade students in the school division who qualified for free and reduced price lunch know more, less, or about the same about computer/technology as did the 2002 fifth and eighth grade students in the school division who also qualified for free and reduced lunch?

13. Do the 2005 eighth grade students in the school division know more, less, or about the same about computer/technology as they did in 2002 as fifth graders as measured by their scaled scores on the 2002 fifth and eighth grade versions of the *Virginia Computer/Technology SOL* assessment instruments?

14. Do the 2005 eighth grade students in the school division who qualified for free and reduced price lunch know more, less, or about the same about computer/technology as they did in 2002 as fifth graders?

Procedures of the Study: Phase I – Teacher Survey

The first phase of this study involved the administration of a teacher questionnaire (Appendix A) containing items developed to determine what teachers' perceptions were regarding the effects of high stakes (*SOL*) testing on decisions they make pertaining to curriculum and instruction issues in their classroom.

Population and Sample

According to Fraenkel and Wallen (2000), a cross-sectional survey collects information from a population at just one point in time, although the collection period may range from a single day to many weeks. This study employed a cross-sectional survey given to a population of all elementary (n = 207) and middle school (n = 130) classroom teachers in a mid-size urban school division in Virginia.

The school division selected for this study had a population of approximately 8,400 students with eleven elementary schools, three middle schools and two high schools. There are approximately 3,832 elementary school students and 1,988 middle school students. The school population demographics are 50.76% Black, 44.72% White, 1.5% Asian, 1.49% other, 1.4% Hispanic, and .13% American Indian. Approximately 53% of the school division's children were provided with free and reduced price breakfast and lunches. According to school officials, it is estimated that nearly 60% of the children are eligible, but many choose not to take advantage of the benefit, particularly at the secondary level.

Instrumentation

Items for the teacher survey (See Appendix A) were modeled from those of the same type used in previous surveys (Taylor et al., 2003; Herman & Golan, 1998) to capture similar data. The questionnaire first asked about teacher grade level, which provided data to sort responses by either elementary or middle school level. The teachers were then asked to write in the number of years they have been teaching, including the current year, to provide data for sorting responses by those who have experience teaching prior to the implementation of *SOL* testing in 1998 and those who did not. The third question asked respondents to estimate the percentage of students they taught who were eligible for free and reduced price lunch. This was used to provide data for comparing those teachers who perceived they were teaching low levels of lower socio-economic status children with those who perceived they were teaching middle and high levels.

Of the remaining 18 items, the questionnaire included six questions that were designed to elicit responses regarding the impact of *SOL* testing on classroom instruction and related activities offered to students, along with the influence of testing on teacher decisions on curriculum planning and delivery. Of these six questions, five contained lines to check yes/no responses, followed by an open-ended prompt such as, "If yes, how…?"

Three questions were designed to collect data on perceived pressure to improve test scores. One of the three used a Likert-type scale response to determine to what extent teachers felt pressure to improve test scores coming from different groups. Respondents were asked to circle a number on a scale to the right of the group name with 1 being "no pressure" up to 5 being "great pressure." At the end of the list, teachers could check "other" and write in the source of the pressure. Another asked about examples of the pressures to improve test scores teachers may be feeling. A checklist of examples was provided and teachers were asked to "Check any or all that apply." At the end of the list, respondents could check "other" and write in the example of the pressure they were feeling. The final item used a Likert-type scale response which asked teachers to circle their degree of agreement with a direct statement that testing creates pressure on teachers to perform.

The survey instrument contained seven items inquiring about the impact of testing on teaching and learning in computer/technology and other non-tested subjects. One of the seven was a direct question asking if the *C/T SOL* were still being taught. Respondents were asked to check a line indicating yes/no, followed by an open-ended prompt of, "Why do you think so?" Four of the seven questions asked for teacher perceptions of student knowledge of computer/technology content. In particular, their perceptions of comparisons of test scores on the 2002 version of the

C/T SOL test between groups of fifth and eighth students from 2002 when testing was in force and groups of fifth and eighth students from 2005 when testing was no longer required.

The final two of the remaining questions on the survey asked teachers about their perceptions of the impact of socio-economic status of students on their knowledge of *C/T SOL* content. Participants were asked to respond to questions which asked them to check "better, worse, or about the same" regarding student performance comparisons. There was also an open-ended response prompt asking, "Why do you think so?" to gather additional data on the way they were feeling.

Survey Validation

The initial draft of the survey instrument was reviewed by five experienced Instructional Technology Specialists and three school division administrators with previous research experience for validity and reliability prior to the data collection period. Following amendments to the initial draft, a second draft questionnaire was sent to five elementary and five middle school teachers who were asked to make notes on the survey if the intent of any questions was unclear.

This third draft of the survey was then sent to the researcher's chair and other members of the committee for review. The resultant draft was then used for the content validity study adapted from Rubio, Berg-Weger, Tebb, & Rauch (2003). The researcher solicited a panel of ten experts: two college professors from teacher preparation programs, two assistant superintendents with doctorates, one high school principal with a doctorate, one elementary school principal, three veteran middle school teachers and one experienced elementary school teacher. Each panel member was provided with a copy of the third draft survey and a response form adapted from Rubio et al. (2003) The form asked the experts to rate each item for clarity and representativeness on a four-point scale with 1 being least and 4 being most. Space was provided under each item number to allow panel members to add comments. In addition, the experts were asked to evaluate the comprehensiveness of the entire measure by indicating items that should be added or deleted (see Appendix B for response form). All ten experts completed the forms. Additional communication between the researcher and members of the panel took place to clarify some of the written comments.

Two types of data analyses were performed on the content validity data collected through the response forms (see Appendix C for complete content validity data for the questionnaire). The first was a calculation to determine interrater agreement (IRA), which is the extent to which the panel members were reliable in their ratings. In accordance with Rubio et al. (2003), IRA was calculated for each item as well as for the whole measure by first combining values one and two and then three and four. The number of experts that rated the item the same was then divided by the total number of experts to determine item IRA. Interrater agreement for the whole questionnaire was determined by dividing the number of items that had 100% agreement by the total number of items. For panels of experts greater than five and for this study, it was recommended by Rubio, et al. (2003) to use a less conservative approach and count the number of items that had an IRA of .80 or greater and divide this number by the total number of items. The reason being that as the number of experts increases the chances of them all being in

agreement is decreased (Rubio et al. 2003). Interrater agreement operations were performed for both representativeness and clarity.

$$\frac{\text{Number of experts that rated the item the same}}{\text{Total number of experts}} = \text{Item IRA}$$

$$\frac{\text{Number of items with 80\% agreement}}{\text{Total number of items}} = \text{Measure IRA}$$

The second type of analysis performed on the questionnaire was a calculation to determine the content validity index (CVI) which is based on the representativeness of the measure. The CVI for each questionnaire item was first calculated by counting the number of experts who rated the item a three or four for representativeness and then dividing that number by the total number of experts. This process determined the proportion of experts who felt the item was valid in its content. The CVI for the questionnaire was estimated by adding item CVI values and dividing by the total number of items, with a recommended final value of at least .80 for new measures (Rubio et al. 2003). Content validity index operations were performed for both representativeness and clarity.

$$\frac{\text{Number of experts that rated the item a 3 or 4}}{\text{Total number of experts}} = \text{Item CVI}$$

$$\frac{\text{Sum of all item CVI values}}{\text{Total number of items}} = \text{Measure CVI}$$

The results of the analyses (see Appendix C) show that the interrater agreement for clarity for all items was at least .80 with 15 of 18 items having 100% (1.0) agreement. The overall IRA for clarity of the measure was calculated to be 100% (1.0). The IRA for all items for representativeness was at least .90 with 15 of 18 items having 100% (1.0) agreement. The overall IRA for representativeness of the measure was also calculated to be 100% (1.0).

The content validity index for clarity for all items was at least .80 with 15 of 18 items having 100% (1.0) agreement. The overall CVI for clarity for the measure was calculated to be .98, which was well above the .80 for new measures recommended by Rubio et al. (2003). The CVI for all items for representativeness was at least .90 with 15 of 18 items having 100% (1.0) agreement. The overall CVI for representativeness was calculated to be .98, which, again, was well above the recommended .80.

Data Collection

A direct administration was chosen for this study since this mode of data collection is used in survey research whenever a researcher has access to all or nearly all of the members of a particular group in one place (Fraenkel & Wallen, 2000).

The superintendent of the school division supplied a cover letter for the survey (see Appendix D) and addressed it to each school's principal. The letter outlined the purpose of the study and the

importance of the teacher data. It accompanied the survey bundles that were sent to the sites through intra-school mail. The principals were requested to stress that information collected from the instrument was anonymous, and that it asked for no identifying data other than the grade level the teacher taught and the number of years the teacher had been teaching.

Survey instruments were distributed in the school buildings on June 8, 2005. Teachers were asked to complete and return them prior to the end of the school day on June 10, 2005. Principals collected the completed surveys and placed them in the intra-school mail addressed to the department for information technology located in the school administration building on or before June 15, 2005.

When polled, the majority (10 of 11) of the elementary school principals indicated they chose to administer the survey at a faculty meeting. A single elementary principal elected to place them in teachers' mailboxes and asked that they complete and return the survey prior to the June 10 deadline.

Two of three middle school principals chose to administer the survey at a faculty meeting. A single middle school principal placed the surveys in teachers' mailboxes and asked them to complete the survey and return it prior to the deadline.

Data Entry and Analysis

Once the survey instruments were collected, they were separated into elementary and middle stacks by the response to question one, which asked for the grade or grades the respondent was currently teaching. The return rate for the survey was 87.4% (n = 181) for the elementary teachers. For the middle school level the return rate was 72.3% (n = 94).

A website interface was designed to allow input from each survey to be entered into a Microsoft Access database. The researcher keyed in all survey data from the 275 returned instruments including the qualitative responses to the open-ended questions which were recorded verbatim. If the short answer responses contained more than one theme, a second or third cell was used to transcribe the data. The raw data was then imported into a Microsoft Excel spreadsheet for sorting and analysis. Each respondent was given a unique identifier so that their row in the spreadsheet would contain both the quantitative responses as well as the qualitative data. Specific columns of data from the spreadsheet were imported into the *Statistical Package for the Social Sciences* (*SPSS*) Version 10 to create tables for analysis of frequencies, percentages, and, for some questions, means and standard deviations. After observing the frequencies for each of the Likert-type items, the percentages of response for each of the items were examined with particular attention to the cumulative percentages. Chi-square tests were performed on the cross tabulated data to determine whether or not any effects were present. A significance level of $\alpha < .05$ was used for the computations.

Another aspect of the analysis involved cross tabulations, which indicated the number of participants who belonged to one or more of three groups or categories. The three classification criteria examined in this study were (1) teachers who were at the elementary level or the middle school level, (2) teachers who had experience teaching prior to the implementation of *SOL* testing in 1998 and those who did not, and (3) teachers who indicated on the survey they

perceived they were teaching either high, middle, or low percentages of lower socio-economic status (SES) students.

For the purposes of disaggregating elementary and middle school data, teachers who circled any grade k through five on question 1 were labeled "e" and those that circled any grade six through eight were labeled "m" under the variable "teach level."

In order to categorize teachers with experience prior to the implementation of *SOL* testing, responses to question 2, which asked for the number of years the respondent has been teaching, were used. Any teacher who indicated eight or less years was labeled "*SOL* Only" and those who indicated they have been teaching nine or more years were labeled "Pre *SOL*" under the variable "sol experience."

To group and cross tabulate teachers who perceived they were teaching high, middle or low percentages of lower SES students, responses to question 3, which asked respondents to estimate the percentage of students they teach who are eligible for free and reduced price lunch, were used.

The frequency of responses to this question was analyzed to determine what perceived percentage values fell into approximately the lower, middle and upper thirds. The lower range was found to be those teachers who perceived they were teaching levels of lower SES students from 0 to 50%. The middle range was found to be 51 to 84%. The upper range was found to be 85 to 100%. Therefore, teachers who indicated on the questionnaire they felt they were teaching classes with 0 to 50% of students qualifying for free and reduced price lunch were categorized as "Low Level SES." Teachers who indicated on the questionnaire they felt they were teaching classes with 51 to 84% of the students qualifying for free and reduced price lunch were categorized as "Middle Level SES." Teachers who indicated on the questionnaire they felt they were teaching classes with 85 to 100% of the students qualifying for free and reduced price lunch were categorized as "High Level SES."

The initial analysis of the open-ended responses involved the reading and transcription of all survey instruments in their entirety. Next the data was imported into a Microsoft Excel spreadsheet and each cell was read and coded for the purpose of identifying and highlighting cells with similar themes. Comments concerning changes in the focus of instruction and the impact of testing on instructional time were coded for sorting. Teacher comments regarding the impact on non-tested content were marked in the same fashion. For responses to teacher perceptions of the impact on lower SES students, comments relating to access and exposure to computer/technology were also coded for sorting. The survey data was recoded two additional times to further analyze and more finely group responses according to content and to aid in sorting responses by groups established earlier in this chapter. Two other independent reviewers were asked to examine the resulting groups or themes and their codes according to content (Erickson, 1986). The results from the qualitative data helped underscore and elaborate upon other more quantitative results from the questionnaire.

Procedures of the Study: Phase II – Student Testing

The purpose of the second phase of this research was to provide data to be considered alongside the teachers' perceptions of whether or not state standards and accountability measures impact their instructional decisions and the curriculum. More specifically, this data would be used in comparison with survey items asking whether teachers felt the *C/T SOL* had or had not been de-emphasized.

Population and Sample

The *Virginia C/T SOL* exam was last administered in the host school division to fifth (n = 625) and eighth (n = 641) grade students in spring 2002. The test was given using a paper and pencil format. The student answer sheets were scanned by Harcourt Brace, the test creator, and the raw scores were stored electronically.

For this study, a population of all 2005 fifth (n = 618) and eighth (n = 698) grade students was selected. The students were located at eleven elementary sites and three middle school sites.

Instrumentation

The 2001 – 2002 Virginia SOL Assessment Technical Report was published by the Virginia Department of Education (VDOE) (2003) to inform users and other interested parties about the development, content and technical characteristics of the Virginia 2001 – 2002 *SOL* assessments. It provided information from the 2001 *SOL* testing cycle which included the spring 2002 administration.

According to this report, summarized in Appendix F, creating the *SOL* assessments, and establishing their validity and reliability, was a complex and time consuming process. It required involvement from the Virginia Department of Education (VDOE), Harcourt Educational Measurement, local school divisions and local education agencies. Teachers, administrators, and content specialists from all over Virginia were recruited for the different test development committees. Committee members came to Richmond on several occasions to work on the tests. Harcourt Educational Measurement in San Antonio, Texas and the VDOE in Richmond were responsible for the development process activities (VDOE, 2003).

In summary, all items that appeared on the spring 1998 *C/T SOL* tests were subjected to the validity and reliability procedures outlined in Appendix F. All items that appeared in subsequent forms of the *C/T SOL* tests up to and including the spring 2002 version were developed in this same manner and subjected to the same procedures.

Test Administration

Elementary School

During the second week in June of 2005, the elementary students were assessed using the fifth grade version of the 2002 *Virginia C/T SOL* test instrument. Classroom teachers served as monitors and the test was administered to fifth graders in all eleven elementary schools. The testing was conducted under the same guidelines and conditions as were in place for the same test in the spring of 2002. Six-hundred and eighteen test booklets with answer sheets were

delivered to the schools. Five-hundred and eighty-three completed answer sheets and test booklets were collected and returned to the department for information technology at the school administration building for electronic scoring. The return rate for the test administration was 94.3%.

Middle School

The eighth grade version of the 2002 *Virginia C/T SOL* test was administered to all eighth grade students in three middle schools during the second week of June 2005. Testing was conducted under the same guidelines and conditions as when the test was administered in spring 2002. Six-hundred and ninety-eight test booklets and answer sheets were delivered to the schools. Five-hundred and twenty-two completed answer sheets and test booklets were collected and returned to the department for information technology at the school administration building for scoring. The return rate for the test administration was 74.8%.

Data Analysis

The answer sheets used for the test administration at both levels were preprinted with both the students' name and testing identification number prior to the test administration. The completed answer sheets were scanned and the students' raw scores stored electronically. This procedure captured the necessary data for the 2005 student data sets for fifth and eighth grade. The fifth and eighth grade data sets from the 2002 test administration were provided in electronic format by Harcourt Brace.

A univariate general linear model was used for statistical procedures because it is used where there is one dependent variable and one or more independents. According to Fraenkel & Wallen (2000), analysis of variance (ANOVA) is used to uncover the main and interaction effects of categorical independent variables, also called factors, on an interval dependent variable. The key statistic in ANOVA is the F-test of difference of group means. This is noted when determining if the means of the groups formed by values of the independent variables are different enough not to have occurred by chance. If the group means do not differ significantly, then the researcher can infer that the independent variables did not have an effect on the dependent variable. If the F test shows that overall the independent variables are related to the dependent variable, then other tests of significance can be used to explore which values of the independents have the most to do with the relationship (Fraenkel & Wallen, 2000). Since the data for this study also involved testing a cohort group twice, a repeated measures ANOVA was used since the F-test is computed differently from the usual between-groups design, but the inference logic is similar.

The *t*-test is a parametric statistical test is also used to determine if the difference between the means of two samples is significant (Fraenkel & Wallen, 2000). The *t*-test for independent means was used post hoc for this study because it is used to compare the mean scores of two different groups who have been tested only once. This *t*-test was used to compare raw scores of 2002 and 2005 lower SES students with all other students of the same grade and year.

Using the *Statistical Package for the Social Sciences (SPSS)* computer software and the raw scores retrieved from the 2002 and the 2005 fifth grade files, a series of univariate ANOVAs were completed comparing testing years and lower SES students with all other students. A significance level of $\alpha < .05$ was used for the computations. A similar series of ANOVAs were

run using *SPSS* and the raw scores from the 2002 and 2005 eighth grade files. The significance level was also set at $\alpha < .05$.

Using *SPSS* software, a series of *t*-tests for independent means were completed comparing 2002 and 2005 fifth grade lower SES students with all other students of the same grade and year. A significance level of $\alpha < .05$ was used for the computations. A similar series of *t*-tests were run comparing 2002 and 2005 eighth grade lower SES students with all other students in the same year.

After comparing 2002 and 2005 data sets, 397 students were identified as having taken the *C/T SOL* test in 2002 as fifth graders and were also tested in this study as eighth graders in the 2005 administration. Since the fifth grade version of the 2002 *C/T SOL* exam had a total of 30 multiple choice questions and the eighth grade version of the *C/T SOL* test contained a total of 40 multiple choice items, and in order to equate for test difficulty, the cohort group's 397 raw scores from the 2002 fifth grade test administration were converted to scale scores using the electronic file provided to the school division by Harcourt-Brace. The raw scores from the 2005 eighth grade test administration for the same cohort group of 397 students were also converted to scale scores using a table from the *2001 – 2002 Virginia SOL Assessment Technical Report* published by the Virginia Department of Education (VDOE) (2003). Using *SPSS* software and the scaled scores, a repeated measures ANOVA was completed comparing testing years and lower SES students with all other students within the cohort group. A significance level of $\alpha < .05$ was used for the computations.

CHAPTER 4: RESULTS

The first section of this chapter presents the results of the Teacher Questionnaire for the *Computer/Technology Standards of Learning (C/T SOL)* study. The second section presents the data comparing the results of the administration of the 2002 *C/T SOL* test to the 2005 fifth and eighth grade students with those of the 2002 grades and the groups within them.

Teacher Survey

The first phase of this study involved the administration of a teacher questionnaire (Appendix A) containing items specially developed to determine what Lynchburg City Schools teachers' perceptions were regarding the effects of high stakes *SOL* testing on decisions they make pertaining to curriculum and instruction issues in their classroom.

Questionnaire Data

This study employed a cross-sectional survey given to a population of all elementary (n = 207) and middle school (n = 130) classroom teachers in a single urban school division in Virginia. The return rate for the survey was 87.4% (n = 181) for the elementary teachers. For the middle school level the return rate was 72.3% (n = 94).

Regarding the questionnaire data, first the survey participants are described and then an analysis of the data for each question of the survey is provided. Chi-square tests were performed on the cross tabulated data to determine whether or not any effects were present. A significance level of $\alpha < .05$ was used for the computations. Although not always statistically significant, differences in frequencies between variables greater than six percent were considered meaningful and were noted above the tables.

The thematic trends in the qualitative data are described alongside open-ended questions of the survey instrument. Instead of presenting the qualitative results separately, the decision was made to present the qualitative results based on the open-ended questions after each section of the quantitative results. This was done to highlight any correspondence between the qualitative and quantitative findings.

Participants

Teachers' Grade Level Status

As shown in Table 1, nearly two thirds of the teacher-participants of the study indicated their primary teaching assignment was at the elementary level (65.8%, n = 181) while 94 participants indicated they were teaching at a middle school. Thus, the total sample size was 275.

Table 1

Teacher Respondents by Grade Level Status

Teaching Level	Frequency	Percent
Elementary	181	65.8%
Middle	94	34.2%
Total	275	100.0%

Teaching Experience

Teacher respondents were asked to indicate the number of years they have been teaching including the 2004-2005 school year. The assumption was made that there might be differences in the responses between those teachers who have taught solely since the *Virginia Standards of Learning (SOL)* assessments were put in place and those who have teaching experience prior to their implementation in 1997-1998. Therefore, as illustrated in Table 2, any teacher who listed their experience as eight years or below was categorized as "*SOL* Only" (32%, $n = 88$) and those who indicated an experience level greater than eight years were categorized as "Pre *SOL*" (66.5%, $n = 183$). A small number of teachers (1.5%, $n = 4$) did not respond to the question regarding the number of years they have been teaching thus making 271 usable pieces of data.

Table 2

Teacher Respondents by Teaching Experience With SOL Assessments

Teaching Experience	Frequency	Percent
Pre *SOL*	183	66.5%
SOL Only	88	32.0%
No Response	4	1.5%
Total	275	100.0%

Teacher Estimates of Free and Reduced Lunch Students

Teacher respondents were asked to estimate the percentage of students they teach who are eligible for free and reduced price lunches. The assumption was made that there might be differences in the responses between those teachers who perceived they were teaching high numbers of low socio-economic status students and those who perceived they were teaching low numbers. The frequency of responses to this question was analyzed to determine what perceived percentage values fell into approximately the lower, middle and upper thirds. The lower range was found to be those teachers who perceived they were teaching levels of lower SES students from 0 to 50% ($n = 92$). The middle range was found to be 51 to 84% ($n = 71$). The upper range was found to be 85 to 100% ($n = 68$). Therefore, as illustrated in Table 3, teachers who indicated on the questionnaire they felt they were teaching classes with 0 to 50% of students qualifying for free and reduced price lunch were categorized as "Low Level SES." Teachers who indicated on the questionnaire they felt they were teaching classes with 51 to 84% of the students qualifying

for free and reduced price lunch were categorized as "Middle Level SES." Teachers who indicated on the questionnaire they felt they were teaching classes with 85 to 100% of the students qualifying for free and reduced price lunch were categorized as "High Level SES."

Table 3

Teacher Respondents by Teaching Perceived Levels of Lower SES Students

Perceived Levels of Lower SES Students	Frequency	Percent
Low Level	92	33.5%
Middle Level	71	25.8%
High Level	87	31.6%
No Response	25	9.1%
Total	275	100.0%

Teacher Questionnaire Data

*Response to question 4: Do you think **classroom instruction in content areas that are SOL tested has changed** since the implementation of SOL testing?*

As presented in Table 4, over eighty percent of teachers (81.1%, $n = 223$) surveyed indicated they thought that classroom instruction in content areas has changed due to the implementation of *SOL* testing. Only a small number (11.6%, $n = 32$) of teachers responded that instruction had not changed. Twenty teachers did not provide a response to the question.

Table 4

Teacher Response to Whether Instruction in Content Areas Has Changed

Instruction In Content Areas Has Changed Due to *SOL* Testing	Frequency	Percent
Yes	223	81.1%
No	32	11.6%
No Response	20	7.3%
Total	275	100.0%

The frequency responses presented in Table 5 were within four percentage points of the average for the total group across the categories of elementary and middle school teachers. Similar percentages were also found across the categories of teachers with Pre *SOL* and *SOL* Only teaching experience in Table 6.

Table 5

Teacher Response by Teaching Level to Whether Instruction in Content Areas Has Changed

Instruction In Content Areas Has Changed Due to *SOL* Testing		Yes	No
Elementary	Frequency	149	19
	Percent	88.7%	11.3%
Middle	Frequency	74	13
	Percent	85.1%	14.9%

$\chi^2 = .398$. $p = .528$.

Table 6

Teacher Response by SOL Experience to Whether Instruction in Content Areas Has Changed

Instruction In Content Areas Has Changed Due to *SOL* Testing		Yes	No
Pre *SOL*	Frequency	147	20
	Percent	88.0%	12.0%
SOL Only	Frequency	72	12
	Percent	85.7%	14.3%

$\chi^2 = .101$. $p = .751$.

Cross tabulations for teachers with perceived high and low levels of lower socio-economic status students in their classes shown in Table 7 indicated that nearly nineteen percent of teachers with low numbers of low SES students (18.6%, $n = 16$) felt that instruction in content areas has not changed, while only 11.1% ($n = 9$) of the teachers with high numbers of lower SES students teachers felt that way.

Table 7

Teacher Response by Perceived Levels of Lower SES Students to Whether Instruction in Content Areas Has Changed

Instruction In Content Areas Has Changed Due to *SOL* Testing	Perceived Levels of Lower SES Students		Yes	No
	Low Level	Frequency	70	16
		Percent	81.4%	18.6%
	Middle Level	Frequency	62	5
		Percent	92.5%	7.5%
	High Level	Frequency	72	9
		Percent	88.9%	11.1%

$\chi^2 = 4.507$. $p = .105$.

The first question was followed by the open-ended prompt, "Why do you think so?" as a means to gain additional insight into this issue. Of those indicating they felt instruction in content areas has changed since the implementation of *SOL* testing, 117 responses (52.5%) related to the focus of instruction being solely on the *SOL*. Comments similar to "The entire focus of instruction has become the students' performance on the *SOL*," and, "The focus of instruction is strictly on teaching the skills the students will be tested on" were common. Complaints about having to "teach to the test" were also mentioned by many.

In addition to comments related to the change in focus of instruction, many teacher responses (22.9%, $n = 51$) were concerned about the impact of the *SOL* on instructional time. Comments similar to "You hardly have enough time to cover all of the required *SOL* material (much less teach for mastery)" were frequent. The concerns about time were centered on the insufficient time to teach all the *SOL* tested curriculum and, consequently, the inability to find time to do anything extra or outside the realm of the tested content.

Response to question 5: Do you think ***classroom instruction in areas not covered by the SOL testing has changed*** *since the implementation of SOL testing?*

As presented in Table 8, most of the teachers surveyed (55.6%, $n = 153$) indicated they thought that classroom instruction in areas not tested has changed due to the implementation of *SOL* testing. About one-third of teachers (33.5%, $n = 92$) responded that instruction had not changed, and just over one-tenth (10.9%, $n = 30$) did not provide a response.

Table 8

Teacher Response to Whether Instruction in Areas Not SOL Tested Has Changed

Instruction In Areas Not Covered By *SOL* Testing Has Changed	Frequency	Percent
Yes	153	55.6%
No	92	33.5%
No Response	30	10.9%
Total	275	100.0%

Chi square analysis indicated a significant difference in teacher perceptions among the elementary and middle school teachers for this survey question. As presented in Table 9, the majority of elementary teachers (71.0%, $n = 115$) felt that instruction has changed in areas not tested by the *SOL*, while less than half of the middle school teachers did (45.8%, $n = 38$). Only twenty-nine percent of elementary teachers felt that instruction had not changed in non-*SOL* tested areas ($n = 47$), while over half (54.2%, $n = 45$) of the middle school teachers felt that way.

Table 9

Teacher Response by Teaching Level to Whether Instruction in Areas Not SOL Tested Has Changed

Instruction In Areas Not Covered By *SOL* Testing Has Changed		Yes	No
Elementary	Frequency	115	47
	Percent	71.0%	29.0%
Middle	Frequency	38	45
	Percent	45.8%	54.2%

$\chi^2 = 13.812$. $^{**}p = .000$.

Cross tabulations as presented in Table 10 also demonstrated differences in the responses of those teachers with teaching experience prior to the implementation of *SOL* testing and those without such experience. The majority of the Pre *SOL* category respondents (63.8%, $n = 104$) indicated that instruction in areas not covered by the *SOL* has changed, while less than that percentage (57.7%, $n = 45$) of the teachers in the *SOL* Only category indicated they felt the same. Nearly a fifth of the *SOL* Only teachers ($n = 16$) chose not to respond to the question. This may also be due to their inability to judge whether instruction has changed since they have only taught under the *SOL*.

Table 10

Teacher Response by SOL Experience to Whether Instruction in Areas Not SOL Tested Has Changed

Instruction In Areas Not Covered By *SOL* Testing Has Changed		Yes	No
Pre *SOL*	Frequency	104	59
	Percent	63.8%	36.2%
SOL Only	Frequency	45	33
	Percent	57.7%	42.3%

$\chi^2 = .596$. $p = .440$.

As presented in Table 11, chi square analysis indicated a significant difference in perceptions of those teachers, categorized as Low Level SES, who perceived they were teaching low numbers of students who qualify for free and reduced price lunch and those High Level SES teachers who estimated high numbers of lower SES students in their classes.

Fifty percent ($n = 42$) of Low Level SES teachers indicated that they felt instruction in non-*SOL* tested areas had not changed, with just under thirty percent of the High Level SES teachers ($n = 23$) believing the same. Over seventy percent (70.1%, $n = 54$) of the High Level SES teachers indicated they felt instruction had changed in areas not tested by the *SOL*, with just half (50%, $n = 42$) of the Low Level SES believing the same.

Table 11

Teacher Response by Perceived Levels of Lower SES Students to Whether Instruction in Areas Not SOL Tested Has Changed

Instruction In Areas Not Covered By *SOL* Testing Has Changed	Perceived Levels of Lower SES Students		Yes	No
	Low Level	Frequency	42	42
		Percent	50.0%	50.0%
	Middle Level	Frequency	44	22
		Percent	66.7%	33.3%
	High Level	Frequency	54	23
		Percent	70.1%	29.9%

$\chi^2 = .7.868$. $*p = .020$.

This question was followed by the open-ended prompt, "Why do you think so?" as a means to gain additional insight into this issue. Among those who indicated they felt instruction in content areas not covered by *SOL* testing has changed, almost forty percent of the responses (39.2%, $n = 60$) related to the focus of instruction being solely on the *SOL* with less emphasis being placed

on other areas. Comments similar to "Less focus (or even none) is directed to these topics" and, "Teachers focus more heavily on those tested *SOLs*" were common.

Also among those who indicated in the affirmative, nearly a third of teachers (31.4%, *n* = 48) listed time as a factor impacting instruction in non-*SOL* areas. This group wrote comments like "There isn't time for instruction other than *SOL* content" and "We no longer have time to teach items that are not covered by *SOL*'s."

Response to question 6: Do you ever ***omit certain information because there is not enough time*** *to fit it in due to the content requirements of the SOL test?*

As presented in Table 12, nearly two thirds (64%, *n* = 176) of the responding teachers indicated that the content requirements of the *SOL* test have caused them to omit certain information. Approximately one third of the teachers did not believe they omitted information (30.2%, *n* = 83).

Table 12

Teacher Response to Whether Information is Omitted Because of Time

Omits Information Because of Time	Frequency	Percent
Yes	176	64.0%
No	83	30.2%
No Response	16	5.8%
Total	275	100.0%

These percentages were similar across the categories of elementary and middle school teachers as shown in Table 13.

Table 13

Teacher Response by Teaching Level to Whether Information is Omitted Because of Time

Omits Information Because of Time		Yes	No
Elementary	Frequency	116	56
	Percent	67.4%	32.6%
Middle	Frequency	60	27
	Percent	69.0%	31.0%

$\chi^2 = .011$. $p = .915$.

Cross tabulations as presented in Table14 demonstrate differences in the responses of those teachers with teaching experience prior to the implementation of the *SOL* and those without such experience. The majority of teachers in both the Pre *SOL* (64.2%, $n = 111$) and the *SOL* Only (74.4%, $n = 61$) categories indicated that they have omitted certain information due to time constraints. However, over one-third of the Pre *SOL* teachers (35.8%, $n = 62$) indicated they do not omit information, while just one-quarter of the *SOL* Only teachers reported the same.

Table 14

Teacher Response to Whether Information is Omitted Because of Time by SOL Experience

Omits Information Because of Time		Yes	No
Pre *SOL*	Frequency	111	62
	Percent	64.2%	35.8%
SOL Only	Frequency	61	21
	Percent	74.4%	25.6%

$\chi^2 = 2.206$. $p = .138$.

Cross tabulations of teachers with perceived high and low levels of lower socio-economic status students in their classrooms shown in Table 15 indicated that over seventy percent of teachers with high levels of lower SES students (70.6%, $n = 60$) have omitted information due to time constraints, while just 60.9% ($n = 53$) of the teachers with low levels of lower SES students believe that to be the case.

Table 15

Teacher Response to Whether Instruction in Areas Not SOL Tested Has Changed by Perceived Levels of Lower SES Students

Omits Information Because of Time	Perceived Levels of Lower SES Students		Yes	No
	Low Level	Frequency	53	34
		Percent	60.9%	39.1%
	Middle Level	Frequency	49	17
		Percent	74.2%	25.8%
	High Level	Frequency	60	25
		Percent	70.6%	29.4%

$\chi^2 = 3.451$. $p = .178$.

Teachers who indicated they had omitted certain information because there was not enough time due to the content requirements of the *SOL* test were asked to provide an example on the questionnaire. However, many responses were general and approximately one fourth of the

responses (*n* = 30) were directed to the *SOL* and their impact on classroom instruction. Comments similar to "You can't go into depth and do true meaningful activities because there is so much emphasis on testing" were common.

Nearly one fourth of the responses (*n* = 38) were directed toward the lack of time teachers felt they had due to the constraints of *SOL* testing. Comments similar to "I cover *SOL* requirements, but can't go into more extension activities because of time," and, "I frequently have to rush through material to cover everything" were common. An additional frustration expressed by these teachers centered on the inability to do "fun" activities due to the time constraints they feel they are under. Many made comments similar to one teacher who wrote, "I skip fun activities (art/centers) to make time for other skills that need to be covered."

Nearly one fourth of the responses (*n* = 40) gave concrete examples of items teachers had omitted from their instruction. Some of the examples included "Egypt -- we used to produce more art type projects which I no longer have time for due to timelines," and, "When studying egypt and china, I left out many interesting facts and activities to their cultures in order to teach the required content." One teacher wrote, "Have cut out many hands-on lab activities in science and now do teacher demonstrations in their place or omit them altogether." Another teacher cited "technology terms and activities" as an example of what was omitted.

Response to question 7: Do you ever ***omit certain activities that may be interesting or beneficial to students due to the content requirements*** *of the SOL test?*

As presented in Table 16, nearly three fourths (72%, *n* = 197) of the responding teachers indicated that the content requirements of the *SOL* test have caused them to omit certain activities that may be interesting or beneficial to students. Less than one fourth of the teachers believed they did not omit any activities (22.9%, *n* = 63).

Table 16

Teacher Response to Whether Activities Are Omitted Due to SOL Test Content Requirements

Omits Activities Due to SOL Test Content Requirements	Frequency	Percent
Yes	197	72.0%
No	63	22.9%
No Response	15	5.1%
Total	275	100.0%

Cross tabulations among elementary and middle school teacher categories highlighted some salient differences in teacher perceptions for this survey question. As presented in Table 17, over three fourths of the elementary teachers (78.6%, *n* = 136) believed they had omitted activities because of *SOL* time constraints, while just over seventy percent of the middle school teachers did (70.5%, *n* = 62).

Table 17

Teacher Response to Whether Activities Are Omitted Due to SOL Test Content Requirements by Teaching Level

Omits Activities Due to SOL Test Content Requirements		Yes	No
Elementary	Frequency	136	37
	Percent	78.6%	21.4%
Middle	Frequency	62	26
	Percent	70.5%	29.5%

$\chi^2 = 1.698$. $p = .193$.

Cross tabulations as presented in Table 18 also demonstrated differences in the responses of those teachers with teaching experience prior to the implementation of the *SOL* and those with none. Nearly eighty percent of the *SOL* Only category respondents (79.8%, $n = 67$) indicated they had omitted activities due to time, while 73.4% ($n = 127$) of the teachers in the Pre *SOL* category indicated they had done the same. A fifth of the *SOL* Only teachers (20.2%, $n = 17$) reported they had not omitted activities, with just over 26% of the Pre *SOL* teachers reporting the same.

Table 18

Teacher Response to Whether Activities Are Omitted Due to SOL Test Content Requirements by SOL Experience

Omits Activities Due to SOL Test Content Requirements		Yes	No
Pre *SOL*	Frequency	127	46
	Percent	73.4%	26.6%
SOL Only	Frequency	67	17
	Percent	79.8%	20.2%

$\chi^2 = .913$. $p = .339$.

Cross tabulations as shown in Table 19 indicate differences in the responses of those teachers, categorized as Low Level SES, who perceived they were teaching low numbers of students who qualify for free and reduced price lunch and those High Level SES teachers who estimated high numbers of lower SES students in their classes.

Nearly eighty-two percent of High Level SES teachers (81.9%, $n = 68$) indicated that they felt they had omitted activities due to time constraints, with just 68.5% ($n = 28$) of the Low Level SES teachers believing the same.

Table 19

Teacher Response to Whether Activities Are Omitted Due to SOL Test Content Requirements by Perceived Levels of Lower SES Students

Omits Activities Due to SOL Test Content Requirements	Perceived Levels of Lower SES Students		Yes	No
	Low Level	Frequency	61	28
		Percent	68.5%	31.5%
	Middle Level	Frequency	52	13
		Percent	80.0%	20.0%
	High Level	Frequency	68	15
		Percent	81.9%	18.1%

$\chi^2 = 4.920$. $p = .085$.

Teachers who indicated they had omitted certain activities that may be interesting or beneficial to students due to the content requirements of the *SOL* test were asked to provide an example on the questionnaire. Over one-third of the responses (35.4%, $n = 70$) were related to the lack of time the Standards of Learning testing had imposed on their ability to provide these activities. Comments similar to "I don't have time to do many activities in order to fill all the material in," and "I cover *SOL* requirements, but can't go into more extension activities because of time" were common. One teacher lamented "Sometimes I'd like to do extension or challenge activities as a follow up to a lesson. However, I don't feel I have much time when I'm trying to cram everything in within a school year."

Nearly thirty percent of teachers (29.8%, $n = 59$) responded with examples along with comments concerning the activities they had omitted. One teacher wrote, "I can't always go with what students are interested in - such as dinosaurs or the solar system- because of content requirements." Another commented, "Information is not omitted because I know this is important and will be tested, however, I would leave off the art project which followed a lesson which the kids really enjoyed due to not enough time before the next skill had to be conveyed that period. This is a shame because these activities are the ones kids remember later in life."

A smaller percentage of teachers (12.6%, $n = 25$) chose to simply comment on the impact that *SOL* testing has had on their ability to provide activities for students. Statements similar to "You can't go into depth and do true meaningful activities because there is so much emphasis on testing" were common. One teacher added, "There are many examples I could give, but the fun in learning has gone away because the drive is to get the students ready for the *SOL* test."

Response to question 8: Do you think student ***access to electives like art, music, and physical education has increased, decreased, or remained the same*** *due to SOL testing.*

As shown in Table 20, a slight majority of teachers overall felt that student access to electives has decreased due to *SOL* testing. The next largest group of teachers (36.4%, *n* = 100) thought access had remained the same. The smallest percentage of respondents (4%, *n* = 11) were those who felt student access to electives had increased.

Table 20

Teacher Response to Whether Student Access to Electives Has changed Due to SOL Testing

Student Access to Electives	Frequency	Percent
Increased	11	4.0%
Decreased	141	51.3%
Remained the Same	100	36.4%
No Response	23	8.4%
Total	275	100.0%

Cross tabulations between categories of elementary and middle school teachers produced similar frequency response rates as shown in Table 21.

Table 21

Teacher Response to Whether Student Access to Electives Has changed Due to SOL Testing by Teaching Level

Student Access to Electives		Increased	Decreased	Remained the Same
Elementary	Frequency	4	92	66
	Percent	2.5%	56.8%	40.7%
Middle	Frequency	7	49	34
	Percent	7.8%	54.4%	37.8%

$\chi^2 = 3.920$. $p = .141$.

As presented in Table 22, chi square analysis indicated a significant difference in the responses of those teachers with teaching experience prior to the implementation of *SOL* testing and those without such experience. Over sixty-three percent of the *SOL* Only category respondents (63.6%, *n* = 49) indicated they felt student access to electives has decreased, while just over half (52.6%, *n* = 90) of the teachers in the Pre *SOL* category indicated they felt the same. Over forty percent (44.4%, *n* = 76) of the Pre *SOL* teachers reported they felt student access had remained the same, while only 28.6% of the *SOL* Only teachers (*n* = 22) felt the same way.

Table 22

Teacher Response to Whether Student Access to Electives Has changed Due to SOL Testing by SOL Experience

Student Access to Electives		Increased	Decreased	Remained the Same
Pre *SOL*	Frequency	5	90	76
	Percent	2.9%	52.6%	44.4%
SOL Only	Frequency	6	49	22
	Percent	7.8%	63.6%	28.6%

$\chi^2 = 7.369$. *$p = .025$.

Cross tabulations between the categories of teachers who perceived they were teaching high or low levels of students who qualify for free and reduced lunch are shown in Table 23.

Table 23

Teacher Response to Whether Student Access to Electives Has changed Due to SOL Testing by Perceived Levels of Lower SES Students

Student Access to Electives	Perceived Levels of Lower SES Students		Increased	Decreased	Remained the Same
	Low Level	Frequency	3	46	41
		Percent	3.3%	51.1%	45.6%
	Middle Level	Frequency	4	45	19
		Percent	5.9%	66.2%	27.9%
	High Level	Frequency	3	42	30
		Percent	4.0%	56.0%	40.0%

$\chi^2 = 5.336$. $p = .254$.

This question was followed by the open-ended prompt, "Why do you think so?" as a means to gain additional insight into this issue. Of those indicating they felt that student access to electives has decreased, just over one-fourth of the responses (25.5%, $n = 36$) related to the lack of time for electives caused by the constraints placed on students and teachers by *SOL* testing. Comments similar to "We need more time in the classroom to teach the *SOL* tested material" and, "We spend less time on the electives and more time on the SOLs" were common. One teacher summarized by writing, "Just check the schedule. There are blocks of time in resource schedule, but teachers cannot access them because of scheduling core instruction."

A slightly smaller percentage of teachers who felt access has decreased (22%, $n = 31$) blamed it on the need for students to attend remediation classes in order to pass the *SOL* tests. "I think

student access has decreased because if a student has failed an *SOL*, they are put in a remediation class. That decreases their opportunity to be in music, art, etc." wrote one teacher. Another commented, "Students not passing *SOLs* are now scheduled for remedial classes (reading, math) instead of having the option of taking an elective."

A smaller portion of those teachers who felt that access has decreased (19.1%, $n = 27$) thought the focus on *SOL* content was the reason. There were many comments similar to "With more emphasis and stress to pass *SOLs* increasing goals, several electives are shortened or skipped." One teacher summarized by stating, "There is more emphasis being made on providing the students with the skills they need to pass the *SOLs* and because of this the students are being taken away from other fun areas."

*Response to Question 9: To what extent do **you feel pressure from the following groups** to improve your students' SOL test scores?*

Respondents were asked to use a Likert-type five point scale to rate the extent to which they felt pressure to improve *SOL* test scores from various groups. Teachers circled the appropriate number on the scale with 1 signifying they felt no pressure, 3 signifying they felt moderate pressure, and 5 signifying they felt great pressure.

Pressure from the School Board

As presented in Table 24, over one-third of the teachers (36%, $n = 99$) indicated they felt great pressure to improve *SOL* test scores coming from the school board.

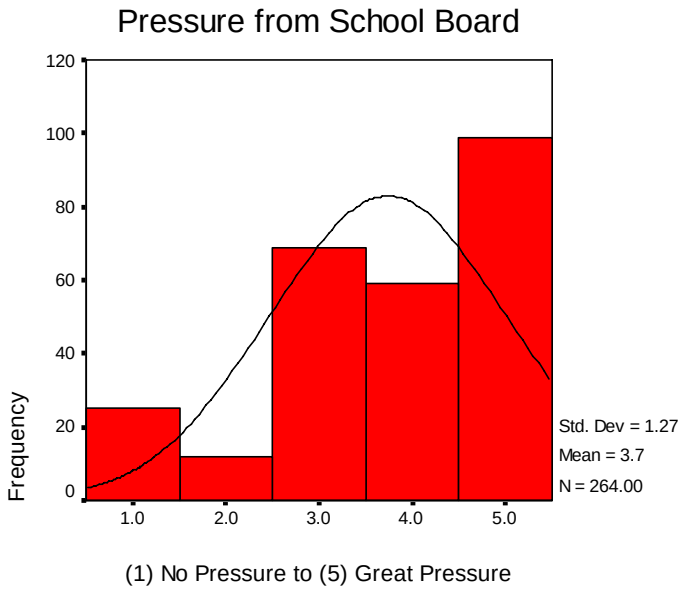
Table 24

Teacher Response to Perceived Pressure from School Board

	Pressure from School Board							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	25	12	69	59	99	264	11	275
Percent	9.1%	4.4%	25.1%	21.5%	36.0%	96.0%	4.0%	100.0%

Figure 1 displays the response frequency for all teachers regarding perceived pressure from the school board.

Figure 1



Cross tabulations of the response frequencies and percentages between teaching level shown in Table 25, *SOL* experience shown in Table 26, and perceived levels of lower SES students shown in Table 27 yielded no significant differences. One notable difference presented in Table 25 was that 16.1% (n = 14) of the middle school teachers indicated they felt no pressure from the school board to improve test scores, while only 6.2% (n = 11) of the elementary teachers felt the same way.

Table 25

Teacher Response by Teaching Level to Perceived Pressure from School Board

Pressure from School Board			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	11	9	53	39	65
		Percent	6.2%	5.1%	29.9%	22.0%	36.7%
	Middle	Frequency	14	3	16	20	34
		Percent	16.1%	3.4%	18.4%	23.0%	39.1%

$\chi^2 = 9.442$. $p = .051$.

Table 26

Teacher Response by SOL Experience to Perceived Pressure from School Board

Pressure from School Board			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	13	10	44	39	68
		Percent	7.5%	5.7%	25.3%	22.4%	39.1%
	SOL Only	Frequency	12	2	24	18	30
		Percent	14.0%	2.3%	27.9%	20.9%	34.9%

$\chi^2 = 4.453$. $p = .348$.

Table 27

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from School Board

Pressure from School Board			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	10	3	31	16	27
		Percent	11.5%	3.4%	35.6%	18.4%	31.0%
	Middle Level	Frequency	7	6	15	17	24
		Percent	10.1%	8.7%	21.7%	24.6%	34.8%
	High Level	Frequency	5	2	17	22	37
		Percent	6.0%	2.4%	20.5%	26.5%	44.6%

$\chi^2 = 13.141$. $p = .107$.

Pressure from the Superintendent

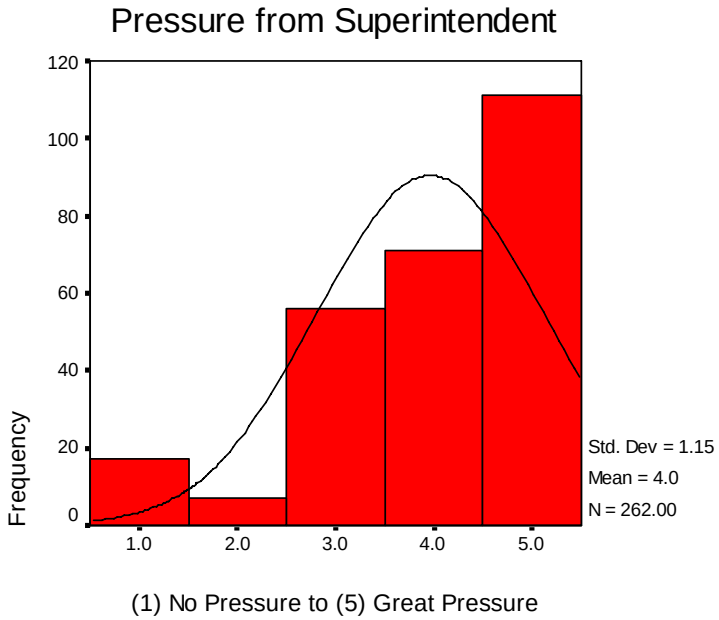
As presented in Table 28, over forty percent of the teachers (40.4%, $n = 111$) indicated they felt great pressure to improve *SOL* test scores coming from the superintendent. When combined, two-thirds of the teachers (66.2%, $n = 182$) rated pressure coming from the superintendent as a four or five (great pressure).

Table 28

	Pressure from Superintendent							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	17	7	56	71	111	262	13	275
Percent	6.2%	2.5%	20.4%	25.8%	40.4%	95.3%	4.7%	100.0%

Figure 2 displays the response frequency for all teachers regarding perceived pressure from the superintendent.

Figure 2



Cross tabulations between elementary and middle school teachers shown in Table 29 were within four percentage points and demonstrated no salient differences. There were similar findings in the cross tabulations of the response frequencies and percentages between Pre *SOL* and *SOL* Only teachers as presented in Table 30.

Table 29

Teacher Response by Teaching Level to Perceived Pressure from Superintendent

Pressure from Superintendent			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	10	4	40	50	73
		Percent	5.6%	2.3%	22.6%	28.2%	41.2%
	Middle	Frequency	7	3	16	21	38
		Percent	8.2%	3.5%	18.8%	24.7%	44.7%

$\chi^2 = 1.479$. $p = .782$.

Table 30

Teacher Response by SOL Experience to Perceived Pressure from Superintendent

Pressure from Superintendent			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	7	4	36	50	76
		Percent	4.0%	2.3%	20.8%	28.9%	43.9%
	SOL Only	Frequency	10	3	19	19	34
		Percent	11.8%	3.5%	22.4%	22.4%	40.0%

$\chi^2 = 6.649$. $p = .156$.

Cross tabulations of the categories of perceived high and low numbers of lower SES students in classrooms found that when combined over seventy-eight percent (78.3%, $n = 65$) of the teachers with perceived high levels of free and reduced price lunch students rated pressure from the superintendent as more than moderate to great. Slightly over forty percent of the High SES group (40.3%, $n = 27$) felt the same way. Chi square analysis indicated a significant difference in the perceptions of the groups ($p = .011$).

A greater percentage of Low Level SES teachers (42.4%, $n = 37$) thought pressure from the superintendent was moderate to none as compared with only 21.7% ($n = 18$) of the High SES Level group.

Table 31

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from Superintendent

Pressure from Superintendent			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	9	1	27	23	27
		Percent	10.3%	1.1%	31.0%	26.4%	31.0%
	Middle Level	Frequency	3	4	10	17	33
		Percent	4.5%	6.0%	14.9%	25.4%	49.3%
	High Level	Frequency	4	0	14	27	38
		Percent	4.8%	0.0%	16.9%	32.5%	45.8%

$\chi^2 = 19.830$. $*p = .011$.

Pressure from the Central Office Administrators

As presented in Table 32, nearly forty-five percent of the teachers (44.7%, $n = 123$) indicated they felt great pressure to improve *SOL* test scores coming from the central office administrators. When combined, nearly seventy percent of the respondents (68%, $n = 187$) rated pressure from the central office a 4 or 5.

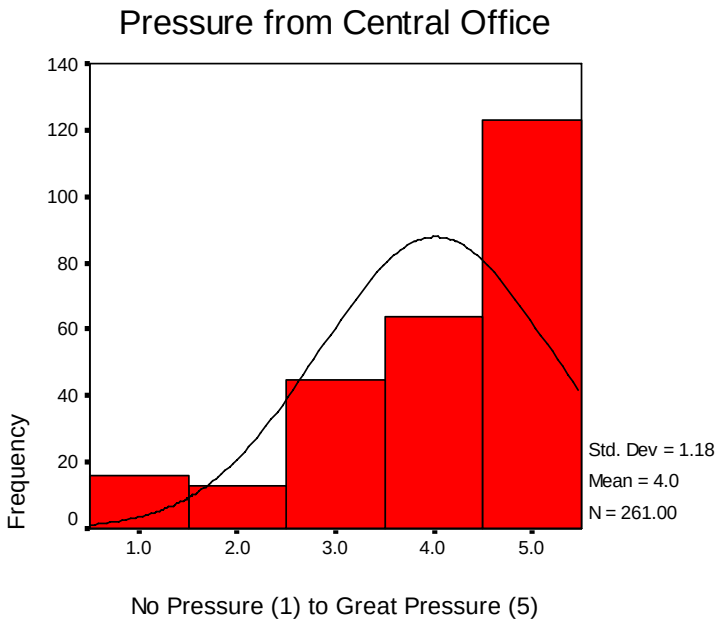
Table 32

Teacher Response to Perceived Pressure from Central Office Administrators

	Pressure from Central Office Administrators							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	16	13	45	64	123	261	14	275
Percent	5.8%	4.7%	16.4%	23.3%	44.7%	94.9%	5.1%	100.0%

Figure 3 displays the response frequency for all teachers regarding perceived pressure from the central office administrators.

Figure 3



As shown in Table 33, cross tabulations between teaching levels indicated that over half the middle school teachers (51.2%, *n* = 43) felt great pressure from the central office administrators, while just over forty-five percent of the elementary teachers felt the same. Thirty-one percent of the elementary teachers (*n* = 55) felt no to moderate pressure from the central office as compared with only 22.6% (*n* = 19) of the middle school teachers.

Table 33

Teacher Response by Teaching Level to Perceived Pressure from Central Office Administrators

Pressure from Central Office Administrators			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	10	10	35	42	80
		Percent	5.6%	5.6%	19.8%	23.7%	45.2%
	Middle	Frequency	6	3	10	22	43
		Percent	7.1%	3.6%	11.9%	26.2%	51.2%

$\chi^2 = 3.322$. $p = .505$.

As presented in Table 34, cross tabulations between teachers with experience prior to the *SOL* and those with *SOL* Only indicated that nearly three-quarters of the Pre *SOL* teachers (75.0%, $n = 129$) felt more than moderate to great pressure from central office administrators with sixty-five percent (64.7%, $n = 55$) of the *SOL* Only teachers feeling the same way.

Table 34

Teacher Response by SOL Experience to Perceived Pressure from Central Office Administrators

Pressure from Central Office Administrators			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	8	7	28	46	83
		Percent	4.7%	4.1%	16.3%	26.7%	48.3%
	SOL Only	Frequency	8	5	17	17	38
		Percent	9.4%	5.9%	20.0%	20.0%	44.7%

$\chi^2 = 4.129$. $p = .389$.

As shown in Table 35, cross tabulations between teachers with perceived levels of lower SES students indicated that over half the High Level SES teachers (54.8%, $n = 46$) felt great pressure from the central office administrators, while just under thirty-three percent of the Low Level SES teachers (32.9%, $n = 28$) felt the same.

Table 35

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from Central Office Administrators

Pressure from Central Office Administrators			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	8	3	22	24	28
		Percent	9.4%	3.5%	25.9%	28.2%	32.9%
	Middle Level	Frequency	2	4	10	17	34
		Percent	3.0%	6.0%	14.9%	25.4%	50.7%
	High Level	Frequency	5	4	10	19	46
		Percent	6.0%	4.8%	11.9%	22.6%	54.8%

$\chi^2 = 13.449$. $p = .097$.

Pressure from the Principal

As presented in Table 36, over forty percent of the teachers (43.6%, $n = 120$) indicated they felt great pressure to improve *SOL* test scores coming from their principal. When combined, over seventy percent of the respondents (71.6%, $n = 197$) rated pressure from the principal a 4 or 5.

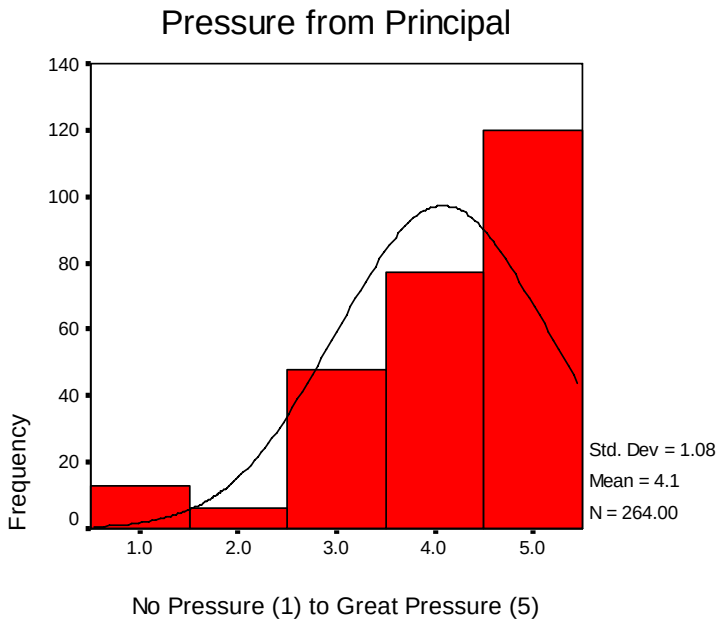
Table 36

Teacher Response to Perceived Pressure from Principal

	Pressure from Principal							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	13	6	48	77	120	264	11	275
Percent	4.7%	2.2%	17.5%	28.0%	43.6%	96.0%	4.0%	100.0%

Figure 4 displays the response frequency for all teachers regarding perceived pressure from the principal.

Figure 4



As shown in Table 37, cross tabulations between teaching levels indicated that almost half the middle school teachers (49.4%, *n* = 42) felt great pressure from the principal, while just over forty-three percent of the elementary teachers (*n* = 78) felt the same. Over twenty percent of the elementary teachers (21.2%, *n* = 38) felt only moderate pressure from their principal as compared with less than twelve percent of the middle school teachers (11.8%, *n* = 10) who felt the same.

Table 37

Teacher Response by Teaching Level to Perceived Pressure from Principal

Pressure from Principal			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	7	3	38	53	78
		Percent	3.9%	1.7%	21.2%	29.6%	43.6%
	Middle	Frequency	6	3	10	24	42
		Percent	7.1%	3.5%	11.8%	28.2%	49.4%

$\chi^2 = 5.340$. $p = .254$.

As presented in Table 38, cross tabulations between teachers with experience prior to the *SOL* and those with *SOL* Only experience indicated no salient differences.

Table 38

Teacher Response by SOL Experience to Perceived Pressure from Principal

Pressure from Principal			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	7	4	30	52	83
		Percent	4.0%	2.3%	17.0%	29.5%	47.2%
	SOL Only	Frequency	6	2	17	24	35
		Percent	7.1%	2.4%	20.2%	28.6%	41.7%

$\chi^2 = 1.860$. $p = .762$.

Cross tabulations of the categories of perceived high and low levels of lower SES students in classrooms found that over eighty-two percent (82.4%, $n = 70$) of the teachers with perceived high levels of free and reduced price lunch students rated pressure from the principal as more than moderate to great. Just 69% (n = 60) of the Low Level SES group felt the same way.

Table 39

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from Principal

Pressure from Principal			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	7	3	17	26	34
		Percent	8.0%	3.4%	19.5%	29.9%	39.1%
	Middle Level	Frequency	2	1	15	16	34
		Percent	2.9%	1.5%	22.1%	23.5%	50.0%
	High Level	Frequency	3	1	11	30	40
		Percent	3.5%	1.2%	12.9%	35.3%	47.1%

$\chi^2 = 8.627$. $p = .375$.

Pressure from Other Teachers

As shown in Table 40, the frequency of teacher responses to pressure coming from other teachers to improve *SOL* test scores was fairly spread out. Just over thirty percent of the teachers (30.5%, $n = 84$) indicated they felt only moderate pressure to improve scores coming from their peers.

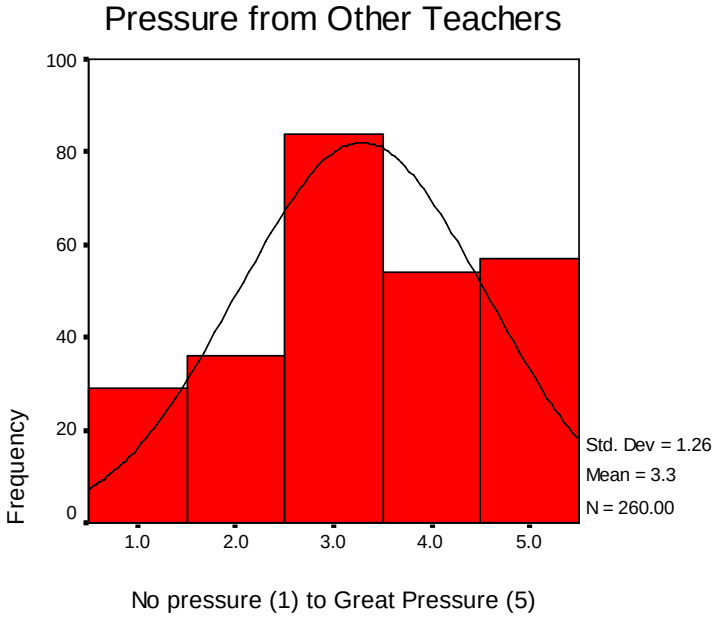
Table 40

Teacher Response to Perceived Pressure from Other Teachers

	Pressure from Other Teachers							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	29	36	84	54	57	260	15	275
Percent	10.5%	13.1%	30.5%	19.6%	20.7%	94.5%	5.5%	100.0%

Figure 5 displays the response frequency for all teachers regarding perceived pressure from other teachers.

Figure 5.



As shown in Table 41, cross tabulations between elementary and middle school teachers demonstrated no salient differences.

Table 41

Teacher Response by Teaching Level to Perceived Pressure from Other Teachers

Pressure from Other Teachers			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	16	27	57	37	37
		Percent	9.2%	15.5%	32.8%	21.3%	21.3%
	Middle	Frequency	13	9	27	17	20
		Percent	15.1%	10.5%	31.4%	19.8%	23.3%

$\chi^2 = 3.069$. $p = .546$.

Cross tabulations shown in Table 42 found that just over forty-six percent of teachers (46.3%, *n* = 80) with experience prior to the implementation of *SOL* testing felt more than moderate to great pressure to improve scores coming from other teachers, while just over thirty-three percent of teachers (33.5%, *n* = 29) with *SOL* only experience indicated the same.

Table 42

Teacher Response by SOL Experience to Perceived Pressure from Other Teachers

Pressure from Other Teachers			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	21	22	50	42	38
		Percent	12.1%	12.7%	28.9%	24.3%	22.0%
	SOL Only	Frequency	8	14	33	11	18
		Percent	9.5%	16.7%	39.3%	13.1%	21.4%

$\chi^2 = 6.296$. $p = .178$.

Cross tabulations shown in Table 43 indicate that nearly thirty percent (28.9%, n = 24) of teachers with perceived high levels of lower socio-economic status students in class felt great pressure coming from other teachers to improve *SOL* test scores, while just over fourteen percent (14.1%, *n* = 12) of the Low Level SES did. Over seventeen percent of the Low Level SES felt no pressure coming from other teachers.

Table 43

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from Other Teachers

Pressure from Other Teachers			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	15	13	27	18	12
		Percent	17.6%	15.3%	31.8%	21.2%	14.1%
	Middle Level	Frequency	3	10	24	15	16
		Percent	4.4%	14.7%	35.3%	22.1%	23.5%
	High Level	Frequency	6	6	30	17	24
		Percent	7.2%	7.2%	36.1%	20.5%	28.9%

$\chi^2 = 14.849$. $p = .062$.

Pressure from Parents

As shown in Table 44, the frequency of teacher responses to pressure coming from parents to improve *SOL* test scores was fairly evenly distributed. Again, the largest percentage of teachers responding in a category (28.7%, *n* = 79) indicated they felt only moderate pressure to improve scores coming from parents.

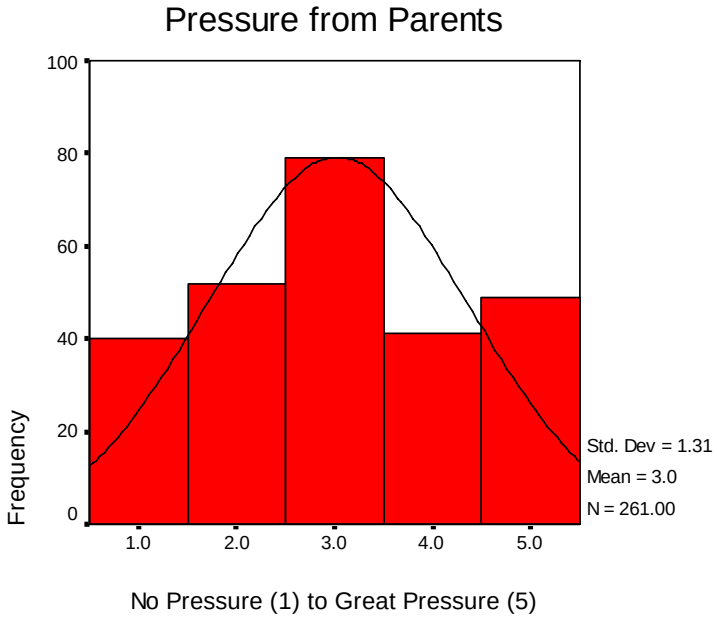
Table 44

Teacher Response to Perceived Pressure from Parents

	Pressure from Parents							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	40	52	79	41	49	261	14	275
Percent	14.5%	18.9%	28.7%	14.9%	17.8%	94.9%	5.1%	100.0%

Figure 6 displays the response frequency for all teachers regarding perceived pressure from parents.

Figure 6



Cross tabulations between elementary and middle school teachers shown in Table 45 demonstrated no salient differences.

Table 45

Teacher Response by Teaching Level to Perceived Pressure from Parents

Pressure from Parents			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	27	33	57	26	32
		Percent	15.4%	18.9%	32.6%	14.9%	18.3%
	Middle	Frequency	13	19	22	15	17
		Percent	15.1%	22.1%	25.6%	17.4%	19.8%

$\chi^2 = 1.550$. $p = .818$.

Cross tabulations between groups based on *SOL* experience shown in Table 46 demonstrated no salient differences.

Table 46

Teacher Response by SOL Experience to Perceived Pressure from Parents

Pressure from Parents			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	26	32	53	30	33
		Percent	14.9%	18.4%	30.5%	17.2%	19.0%
	SOL Only	Frequency	13	19	26	11	14
		Percent	15.7%	22.9%	31.3%	13.3%	16.9%

$\chi^2 = 1.302$. $p = .861$.

Cross tabulations presented in Table 47 show a fairly even frequency distribution regarding pressure from parents and perceived levels of lower SES students in class.

Table 47

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from Parents

Pressure from Parents			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	16	14	28	16	13
		Percent	18.4%	16.1%	32.2%	18.4%	14.9%
	Middle Level	Frequency	5	15	22	12	13
		Percent	7.5%	22.4%	32.8%	17.9%	19.4%
	High Level	Frequency	13	20	24	9	18
		Percent	15.5%	23.8%	28.6%	10.7%	21.4%

$\chi^2 = 7.917$. $p = .442$.

Pressure from Community Members

As shown in Table 48, the frequency of teacher responses to pressure coming from community members to improve *SOL* test scores was fairly evenly distributed. Under one fourth of the teachers (24.7%, $n = 68$) indicated they felt only moderate pressure to improve scores coming from parents. Over forty percent of teachers (42.2%, $n = 116$) rated the pressure from community members as a 1 or 2, indicating they felt little or no pressure coming from this group.

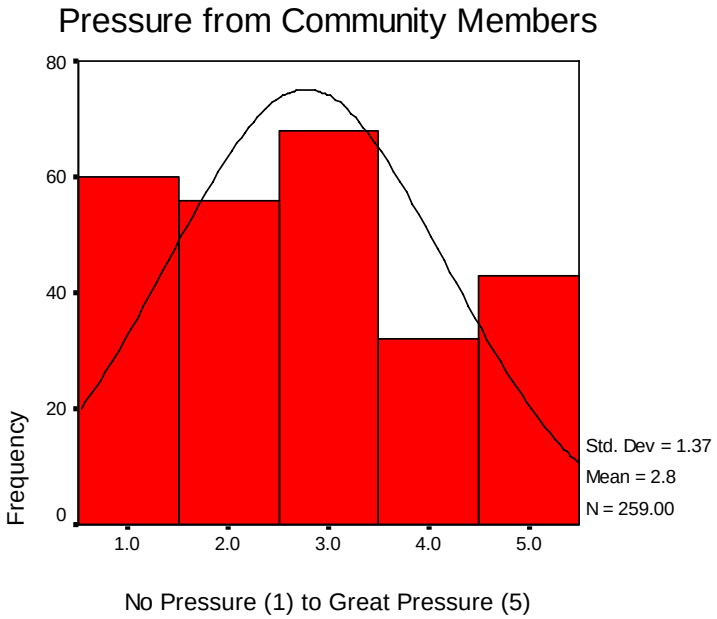
Table 48

Teacher Response to Perceived Pressure from Community Members

	Pressure from Community Members							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	60	56	68	32	43	259	16	275
Percent	21.8%	20.4%	24.7%	11.6%	15.6%	94.2%	5.8%	100.0%

Figure 7 displays the response frequency for all teachers regarding perceived pressure from community members.

Figure 7



As shown in Table 49, cross tabulations between teaching levels indicated that more than twenty percent of the middle school teachers (21.2%, $n = 18$) felt great pressure from the community, while under fifteen percent of the elementary teachers (14.4%, $n = 25$) felt the same. Over twenty-three percent of the elementary teachers (23.6%, $n = 41$) felt less than moderate pressure from community members as compared to 17.6% of the middle school teachers ($n = 15$) who indicated the same.

Table 49

Teacher Response by Teaching Level to Perceived Pressure from Community Members

Pressure from Community Members			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	38	41	46	24	25
		Percent	21.8%	23.6%	26.4%	13.8%	14.4%
	Middle	Frequency	22	15	22	8	18
		Percent	25.9%	17.6%	25.9%	9.4%	21.2%

$\chi^2 = 3.816$. $p = .432$.

As shown in Table 50, cross tabulations between *SOL* teaching experience indicated no salient differences.

Table 50

Teacher Response by SOL Experience to Perceived Pressure from Community Members

Pressure from Community Members			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	39	35	47	26	25
		Percent	22.7%	20.3%	27.3%	15.1%	14.5%
	SOL Only	Frequency	20	20	21	5	17
		Percent	24.1%	24.1%	25.3%	6.0%	20.5%

$\chi^2 = 5.509$. $p = .239$.

As shown in Table 51, cross tabulations between teaching perceived levels of lower SES students indicated that more than thirty-one percent of the High Level SES teachers (31.3%, $n = 26$) felt more than moderate to great pressure from the community, while only twenty-two percent of the Low Level SES teachers (22.3%, $n = 19$) felt the same.

Table 51

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from Community Members

Pressure from Community Members			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	22	21	23	11	8
		Percent	25.9%	24.7%	27.1%	12.9%	9.4%
	Middle Level	Frequency	14	13	19	9	13
		Percent	20.6%	19.1%	27.9%	13.2%	19.1%
	High Level	Frequency	18	20	19	9	17
		Percent	21.7%	24.1%	22.9%	10.8%	20.5%

$\chi^2 = 5.541$. $p = .699$.

Pressure from the Media

As shown in Table 52, over one third of the teachers (35.3%, $n = 97$) indicated they felt great pressure to improve scores coming from the media. Over fifty percent of teachers (54.2%, $n = 149$) rated the pressure from the media as more than moderate to great.

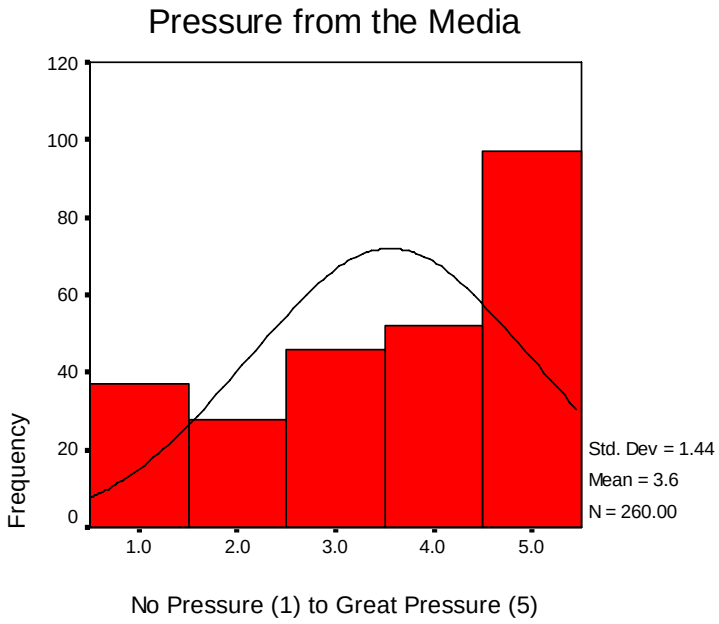
Table 52

Teacher Response to Perceived Pressure from the Media

	Pressure from the Media							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	37	28	46	52	97	260	15	275
Percent	13.5%	10.2%	16.7%	18.9%	35.3%	94.5%	5.5%	100.0%

Figure 8 displays the response frequency for all teachers regarding perceived pressure from the media.

Figure 8



Cross tabulations between elementary and middle school teachers as shown in Table 53 demonstrated no salient differences.

Table 53

Teacher Response by Teaching Level to Perceived Pressure from the Media

Pressure from the Media			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	26	20	31	33	65
		Percent	14.9%	11.4%	17.7%	18.9%	37.1%
	Middle	Frequency	11	8	15	19	32
		Percent	12.9%	9.4%	17.6%	22.4%	37.6%

$\chi^2 = 717$. $p = .949$.

As shown in Table 54, cross tabulations between teaching experience indicated that more than thirty-three percent of the *SOL* Only teachers (433.8%, $n = 28$) felt less than moderate to no pressure from the media to improve *SOL* scores, while just under twenty-one percent of the Pre *SOL* teachers (20.8%, $n = 36$) felt the same.

Table 54

Teacher Response by SOL Experience to Perceived Pressure from the Media

Pressure from the Media			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	21	15	36	38	63
		Percent	12.1%	8.7%	20.8%	22.0%	36.4%
	SOL Only	Frequency	15	13	10	14	31
		Percent	18.1%	15.7%	12.0%	16.9%	37.3%

$\chi^2 = 7.038$. $p = .134$.

As shown in Table 55, cross tabulations between teaching perceived levels of lower SES students indicated that forty-four percent of the perceived High Level SES teachers ($n = 37$) felt great pressure from the media to improve *SOL* test scores, while just over twenty-five percent of the Low Level SES teachers (25.9%, $n = 22$) felt the same. Slightly more than twenty-one percent of the Low Level SES teachers (21.2%, $n = 18$) felt no pressure from the media as compared to just 13.1% of the High Level SES teachers ($n = 11$) who indicated the same.

Table 55

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from the Media

Pressure from the Media			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	18	7	19	19	22
		Percent	21.2%	8.2%	22.4%	22.4%	25.9%
	Middle Level	Frequency	4	9	13	12	30
		Percent	5.9%	13.2%	19.1%	17.6%	44.1%
	High Level	Frequency	11	10	10	16	37
		Percent	13.1%	11.9%	11.9%	19.0%	44.0%

$\chi^2 = 15.351$. $p = .053$.

Pressure from Other Sources

As shown in Table 56, 78.8% of the teachers chose not to check this item, which included a line for them to write on, indicating the source of the other pressure they were feeling. Of those that did respond, just over nine percent (9.1%, $n = 25$) of the teachers indicated that they felt no pressure to improve students' *SOL* test scores coming from other sources. Of the teachers reporting they felt great pressure from other sources, 63.6% ($n = 21$) of them cited themselves as the source, as did 66.6% ($n = 2$) of the respondents who felt more than moderate pressure with a rating of 4.

Nearly one quarter of the teachers who reported feeling great pressure (24.2%, $n = 8$) indicated that the source of the pressure was the government.

Table 56

Teacher Response to Perceived Pressure from Other Sources

	Pressure from Other Sources							
	No Pressure		Moderate		Great			
	1	2	3	4	5	Total	No Response	Total
Frequency	25	0	0	3	33	61	214	275
Percent	9.1%	0.0%	0.0%	1.1%	12.0%	28.2%	77.8%	100.0%

Cross tabulations between elementary and middle school teachers as shown in Table 57 demonstrated no salient differences. There were similar findings in the cross tabulations of the response frequencies and percentages between Pre *SOL* and *SOL* Only teacher groups found in Table 58 and High and Low Level SES teachers found in Table 59.

Table 57

Teacher Response by Teaching Level to Perceived Pressure from Other Sources

Pressure from Other Sources			No		Moderate		Great
			1	2	3	4	5
Teaching Level	Elementary	Frequency	25	0	0	0	21
		Percent	54.3%	0	0	0	45.7%
	Middle	Frequency	0	0	0	3	12
		Percent	0.0%	0.0%	0.0%	20.0%	80.0%

$\chi^2 = 19.819$. $^{**}p = .000$.

Table 58

Teacher Response by SOL Experience to Perceived Pressure from Other Sources

Pressure from Other Sources			No		Moderate		Great
			1	2	3	4	5
Teaching Experience	Pre *SOL*	Frequency	23	0	0	3	19
		Percent	51.1%	0.0%	0.0%	6.7%	42.2%
	SOL Only	Frequency	2	0	0	0	12
		Percent	14.3%	0.0%	0.0%	0.0%	85.7%

$\chi^2 = 8.195$. $^{*}p = .017$.

Table 59

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure from Other Sources

Pressure from Other Sources			No		Moderate		Great
			1	2	3	4	5
Perceived Level of Lower SES Students	Low Level	Frequency	5	0	0	1	9
		Percent	33.3%	0.0%	5	6.7%	60.0%
	Middle Level	Frequency	9	0	0	0	9
		Percent	50.0%	0.0%	0.0%	0.0%	50.0%
	High Level	Frequency	11	0	0	0	12
		Percent	47.8%	0.0%	0.0%	0.0%	52.2%

$\chi^2 = 3.498$. $p = .478$.

*Response to question 10: If you **feel pressure to improve test scores**, what are examples of the pressure(s) you feel?*

Teachers were provided with a list of possible examples of the pressure they may be feeling and asked to check any or all that apply.

No pressure felt

As presented in Table 60, less than five percent of the teachers who responded (4.7%, $n = 13$) felt they were feeling no pressure to improve *SOL* test scores.

Table 60

Teacher Response to Perceived Pressure to Improve SOL Test Scores

No Pressure Felt	Yes	Not Checked	Total
Frequency	13	262	275
Percent	4.7%	95.3%	100.0%

Cross tabulations between elementary and middle school teachers found in Table 61 demonstrated no salient differences. There were similar findings in the cross tabulations of the response frequencies and percentages between teachers with and without *SOL* experience shown in Table 62 and with perceived High and Low Levels of lower SES students found in Table 63.

Table 61

Teacher Response by Teaching Level to Perceived Pressure to Improve SOL Test Scores

No Pressure Felt			Yes	Not Checked
Teaching Level	Elementary	Frequency	6	175
		Percent	3.3%	96.7%
	Middle	Frequency	7	87
		Percent	7.4%	92.6%

$\chi^2 = 1.518$. $p = .218$.

Table 62

Teacher Response by SOL Experience to Perceived Pressure to Improve SOL Test Scores

No Pressure Felt			Yes	Not Checked
Teaching Experience	Pre *SOL*	Frequency	8	175
		Percent	4.4%	95.6%
	SOL Only	Frequency	5	83
		Percent	5.7%	94.3%

$\chi^2 = .029$. $p = .866$.

Table 63

Teacher Response by Perceived Level of Lower SES Students to Perceived Pressure to Improve SOL Test Scores

No Pressure Felt			Yes	Not Checked
Perceived Level of Lower SES Students	Low Level	Frequency	6	86
		Percent	6.5%	93.5%
	Middle Level	Frequency	4	67
		Percent	5.6%	94.4%
	High Level	Frequency	2	85
		Percent	2.3%	97.7%

$\chi^2 = 1.896$. $p = .388$.

Pressure to cover all required curriculum

As shown in Table 64, over two-thirds of the teachers (68%, $n = 187$) indicated they felt pressure to cover the required curriculum.

Table 64

Teacher Response to Perceived Pressure to Cover the Curriculum

Pressure to Cover the Curriculum	Yes	Not Checked	Total
Frequency	187	88	275
Percent	68.0%	32.0%	100.0%

Chi square analysis indicated a significant difference in teacher perceptions of elementary and middle school teachers ($p = .002$). Cross tabulations shown in Table 65 indicate that nearly three-fourths of the elementary teachers who responded (74.6%, $n = 135$) felt pressure to cover the required curriculum, while just over fifty-five percent of the middle school teachers (55.3%, $n = 52$) felt that way.

Table 65

Teacher Response by Teaching Level to Perceived Pressure to Cover the Curriculum

Pressure to Cover the Curriculum			Yes	Not Checked
Teaching Level	Elementary	Frequency	135	46
		Percent	74.6%	25.4%
	Middle	Frequency	52	42
		Percent	55.3%	44.7%

$\chi^2 = 9.687$. $^{**}p = .002$.

Cross tabulations by *SOL* teaching experience produced no salient differences as shown in Table 66.

Table 66

Teacher Response by SOL Experience to Perceived Pressure to Cover the Curriculum

Pressure to Cover the Curriculum			Yes	Not Checked
Teaching Experience	Pre *SOL*	Frequency	123	60
		Percent	67.2%	32.8%
	SOL Only	Frequency	61	27
		Percent	69.3%	30.7%

$\chi^2 = .044$ $p = .835$.

Cross tabulations by perceived levels of lower SES students in class shown in Table 67 indicated that seventy-seven percent ($n = 67$) of Low Level SES teachers felt pressure to cover the required curriculum, while just sixty-two percent ($n = 44$) of the High Level SES teachers felt the same way.

Table 67

Teacher Response by Perceived Levels of Lower SES Students to Perceived Pressure to Cover the Curriculum

Pressure to Cover the Curriculum			Yes	Not Checked
Perceived Level of Lower SES Students	Low Level	Frequency	67	20
		Percent	77.0%	23.0%
	Middle Level	Frequency	63	29
		Percent	68.5%	31.5%
	High Level	Frequency	44	27
		Percent	62.0%	38.0%

$\chi^2 = 4.226$. $p = .118$.

Pressure to have all students in my class pass the SOL test

As presented in Table 68, over seventy-five percent of the respondents (75.6%, $n = 208$) indicated they felt pressure to have all students in their class pass the *SOL* test.

Table 68

Teacher Response to Perceived Pressure to Have All Students Pass

Pressure to Have All Students Pass	Yes	Not Checked	Total
Frequency	208	67	275
Percent	75.6%	24.4%	100.0%

Chi square analysis indicated a significant difference ($p = .004$) as cross tabulations shown in Table 69 indicate that nearly three-fourths of the elementary teachers who responded (74.6%, $n = 135$) felt pressure to have all students pass, while just over fifty-five percent of the middle school teachers (55.3%, $n = 52$) felt that way.

Table 69

Teacher Response by Teaching Level to Perceived Pressure to Have All Students Pass

Pressure to Have All Students Pass			Yes	Not Checked
Teaching Level	Elementary	Frequency	147	34
		Percent	81.2%	18.8%
	Middle	Frequency	61	33
		Percent	64.9%	35.1%

$\chi^2 = 8.080$. $^{**}p = .004$.

Cross tabulations between Pre *SOL* and *SOL* Only teachers shown in Table 70 demonstrated no salient differences. There were similar findings in the cross tabulations of the response frequencies and percentages between teachers with perceived high and low levels of lower SES students shown in Table 71.

Table 70

Teacher Response by SOL Experience to Perceived Pressure to Have All Students Pass

Pressure to Have All Students Pass			Yes	Not Checked
Teaching Experience	Pre *SOL*	Frequency	137	46
		Percent	74.9%	25.1%
	SOL Only	Frequency	68	20
		Percent	77.3%	22.7%

$\chi^2 = .079$. $p = .778$.

Table 71

Teacher Response by Perceived Level of Lower SES Students to Perceived Pressure to Have All Students Pass

Pressure to Have All Students Pass			Yes	Not Checked
Perceived Level of Lower SES Students	Low Level	Frequency	70	17
		Percent	80.5%	19.5%
	Middle Level	Frequency	68	24
		Percent	73.9%	26.1%
	High Level	Frequency	53	18
		Percent	74.6%	25.4%

$\chi^2 = 1.232$. $p = .540$.

Pressure to have my school accredited

As presented in Table 72, over seventy-eight percent of the respondents (78.5%, $n = 216$) indicated they felt pressure to have their school accredited.

Table 72

Teacher Response to Perceived Pressure to Have School Accredited

Pressure to Have School Accredited	Yes	Not Checked	Total
Frequency	216	59	275
Percent	78.5%	21.5%	100.0%

Chi square analysis indicated a significant difference ($p = .023$) as cross tabulations of elementary and middle school teachers shown in Table 73 indicate that nearly eighty-three percent of the elementary teachers who responded (82.9%, $n = 150$) felt pressure to have their school accredited. Just over seventy percent of the middle school teachers (70.2%, $n = 66$) felt the same way.

Table 73

Teacher Response by Teaching Level to Perceived Pressure to Have School Accredited

Pressure to Have School Accredited			Yes	Not Checked
Teaching Level	Elementary	Frequency	150	31
		Percent	82.9%	17.1%
	Middle	Frequency	66	28
		Percent	70.2%	29.8%

$\chi^2 = 5.157$. *$p = .023$.

Cross tabulations between Pre *SOL* and *SOL* Only teachers shown in Table 74 demonstrated no salient differences. There were similar findings in the cross tabulations of the response frequencies and percentages between teachers with perceived High and Low Levels of lower SES students shown in Table 75.

Table 74

Teacher Response by SOL Experience to Perceived Pressure to Have School Accredited

Pressure to Have School Accredited			Yes	Not Checked
Teaching Experience	Pre *SOL*	Frequency	141	42
		Percent	77.0%	23.0%
	SOL Only	Frequency	72	16
		Percent	81.8%	18.2%

$\chi^2 = .545$. $p = .460$.

Table 75

Teacher Response by Perceived Level of Lower SES Students to Perceived Pressure to Have School Accredited

Pressure to Have School Accredited			Yes	Not Checked
Perceived Level of Lower SES Students	Low Level	Frequency	71	21
		Percent	77.2%	22.8%
	Middle Level	Frequency	55	16
		Percent	77.5%	22.5%
	High Level	Frequency	70	17
		Percent	80.5%	19.5%

$\chi^2 = .336$ $p = .845$.

Pressure to perform well enough to avoid a negative evaluation

As shown in Table 76, just over fifty-five percent of the teachers (55.3%, $n = 152$) indicated they felt pressure to perform well enough to avoid a negative evaluation.

Table 76

Teacher Response to Perceived Pressure to Avoid a Negative Evaluation

Pressure to Avoid a Negative Evaluation	Yes	Not Checked	Total
Frequency	152	123	275
Percent	55.3%	44.7%	100.0%

Cross tabulations of elementary and middle school teachers shown in Table 77 show that 57.5% ($n = 104$) of the elementary teachers who responded felt pressure to perform well enough to avoid a negative evaluation, while just 51.1% ($n = 48$) of the middle school teachers felt the same way.

Table 77

Teacher Response by Teaching Level to Perceived Pressure to Avoid a Negative Evaluation

Pressure to Avoid a Negative Evaluation			Yes	Not Checked
Teaching Level	Elementary	Frequency	104	77
		Percent	57.5%	42.5%
	Middle	Frequency	48	46
		Percent	51.1%	48.9%

$\chi^2 = .781$. $p = .377$.

Cross tabulations of Pre *SOL* and *SOL* Only teachers shown in Table 78 demonstrated no salient differences.

Table 78

Teacher Response by SOL Experience to Perceived Pressure to Avoid a Negative Evaluation

Pressure to Avoid a Negative Evaluation			Yes	Not Checked
Teaching Experience	Pre *SOL*	Frequency	101	82
		Percent	55.2%	44.8%
	SOL Only	Frequency	50	38
		Percent	56.8%	43.2%

$\chi^2 = .015$. $p = .903$.

Cross tabulations between teachers with perceived High and Low Levels of lower SES students shown in Table 79 indicated that over sixty percent (60.9%, $n = 53$) of High Level SES teachers felt pressure to avoid a negative evaluation, while just half of the Low Level SES teachers did.

Table 79

Teacher Response by Perceived Level of Lower SES Students to Perceived Pressure to Avoid a Negative Evaluation

Pressure to Avoid a Negative Evaluation			Yes	Not Checked
Perceived Level of Lower SES Students	Low Level	Frequency	46	46
		Percent	50.0%	50.0%
	Middle Level	Frequency	39	32
		Percent	54.9%	45.1%
	High Level	Frequency	53	34
		Percent	60.9%	39.1%

$\chi^2 = 2.159$. $p = .340$.

Pressure to meet the needs of special education students who are required to take the SOL test

As presented in Table 80, over fifty-four percent of the teachers who responded (54.2%, *n* = 149) felt they were feeling pressure to meet the needs of special education students who are required to take the *SOL* test.

Table 80

Teacher Response to Perceived Pressure to Meet the Needs of Special Education Students

Pressure to Meet the Needs of Special Education Students	Yes	Not Checked	Total
Frequency	149	126	275
Percent	54.2%	45.8%	100.0%

Cross tabulations of elementary and middle school teachers shown in Table 81 indicate that fifty-eight percent of the elementary school teachers who responded (*n* = 105) felt pressure to meet special education students' needs, while just under forty-seven percent of the middle school teachers (46.8%, *n* = 44) did.

Table 81

Teacher Response by Teaching Level to Perceived Pressure to Meet the Needs of Special Education Students

Pressure to Meet the Needs of Special Education Students			Yes	Not Checked
Teaching Level	Elementary	Frequency	105	76
		Percent	58.0%	42.0%
	Middle	Frequency	44	50
		Percent	46.8%	53.2%

$\chi^2 = 2.693$. $p = .101$.

Cross tabulations of Pre *SOL* and *SOL* Only teachers shown in Table 82 demonstrated no salient differences.

Table 82

Teacher Response by SOL Experience to Perceived Pressure to Meet the Needs of Special Education Students

Pressure to Meet the Needs of Special Education Students			Yes	Not Checked
Teaching Experience	Pre *SOL*	Frequency	97	86
		Percent	53.0%	47.0%
	SOL Only	Frequency	50	38
		Percent	56.8%	43.2%

$\chi^2 = .211$. $p = .646$.

Cross tabulations between teachers with perceived high and low levels of low SES students shown in Table 83 indicated that over sixty percent (62.1%, $n = 54$) of High Level SES teachers felt pressure to meet the needs of special education students. Less than half the Low Level SES teachers felt the same way.

Table 83

Teacher Response by Perceived Level of Lower SES Students to Perceived Pressure to Meet the Needs of Special Education Students

Pressure to Meet the Needs of Special Education Students			Yes	Not Checked
Perceived Level of Lower SES Students	Low Level	Frequency	45	47
		Percent	48.9%	51.1%
	Middle Level	Frequency	39	32
		Percent	54.9%	45.1%
	High Level	Frequency	54	33
		Percent	62.1%	37.9%

$\chi^2 = 3.132$. $p = .290$.

Other examples of feeling pressure to improve test scores

As shown in Table 84, 94.2% ($n = 259$) of the teachers chose not to check this item, which included a line for them to write on, indicating the source of the other pressure to improve test scores they were feeling. Of those that did respond, less than six percent of the teachers (5.8%, $n = 16$) cited examples.

Table 84

Teacher Response to Perceived Other Pressure to Improve Test Scores

Other Pressure to Improve Test Scores	Yes	Not Checked	Total
Frequency	16	259	275
Percent	5.8%	94.2%	100.0%

Cross tabulations between teaching levels shown in Table 85 and Pre *SOL* and *SOL* Only teachers shown in Table 86 demonstrated no salient differences. There were similar findings in the cross tabulations of the response frequencies between teachers with perceived high and low levels of lower SES students illustrated in Table 87.

Table 85

Teacher Response by Teaching Level to Perceived Other Pressure to Improve Test Scores

Other Pressure to Improve Test Scores			Yes	Not Checked
Teaching Level	Elementary	Frequency	6	175
		Percent	3.3%	96.7%
	Middle	Frequency	10	84
		Percent	10.6%	89.4%

$\chi^2 = 4.793$. $^*p = .029$.

Table 86

Teacher Response by SOL Experience to Perceived Other Pressure to Improve Test Scores

Other Pressure to Improve Test Scores			Yes	Not Checked
Teaching Experience	Pre *SOL*	Frequency	12	171
		Percent	6.6%	93.4%
	SOL Only	Frequency	3	85
		Percent	3.4%	96.6%

$\chi^2 = 605$. $p = .437$.

Table 87

Teacher Response by Perceived Level of Lower SES Students to Perceived Other Pressure to Improve Test Scores

Other Pressure to Improve Test Scores			Yes	Not Checked
Perceived Level of Lower SES Students	Low Level	Frequency	8	84
		Percent	8.7%	91.3%
	Middle Level	Frequency	4	67
		Percent	5.6%	94.4%
	High Level	Frequency	3	84
		Percent	3.4%	96.6%

$\chi^2 = 2.207$. $p = .332$.

Of the examples provided by the respondents, 43.7% ($n = 7$) cited "pressure to lower achievement gap between groups of students," with comments particular to minority and majority students. Other comments related to the pressures of the No Child Left Behind (NCLB) legislation. One teacher noted, "Under NCLB, pressure to 'carry' the school scores as accreditation rests on reading and math." Another noted the school choice provision under NCLB with "competition with private schools and/or GO [Gifted Opportunity] Center."

*Response to question 11: Do you believe the **Computer/Technology SOL are still being taught in your school despite the fact that they are no longer being accessed** by the state?*

As shown in Table 88, just under half the teachers who responded (49.8%, $n = 137$) believed that the *C/T SOL* were still being taught despite not being assessed by the state. Just over forty percent (41.5%, $n = 114$) believed they were not being taught and 8.7% ($n = 24$) chose not to respond.

Table 88

Teacher Response to Whether the C/T SOL Are Still Being Taught

C/T SOL Still Being Taught	Frequency	Percent
Yes	137	49.8%
No	114	41.5%
No Response	24	8.7%
Total	275	100.0%

Chi square analysis indicated a significant difference ($p = .002$) as cross tabulations of responses between elementary and middle school teachers shown in Table 89 indicate that over sixty-nine percent (69.6%, $n = 55$) of the middle school teachers felt that the *C/T SOL* were still being taught. Only 47.7 % ($n = 82$) of the elementary teachers felt the same way.

Table 89

Teacher Response by Teaching Level to Whether the C/T SOL Are Still Being Taught

C/T SOL Still Being Taught		Yes	No
Elementary	Frequency	82	90
	Percent	47.7%	52.3%
Middle	Frequency	55	24
	Percent	69.6%	30.4%

$\chi^2 = 9.651$. $^{**}p = .002$.

Cross tabulations of responses between Pre *SOL* and *SOL* Only teachers shown in Table 90 indicate that fifty-nine percent ($n = 49$) of the teachers with *SOL* only experience felt that the *C/T SOL* were still being taught, while only 51.5% ($n = 85$) of the Pre *SOL* teachers agreed with them.

Table 90

Teacher Response by SOL Experience to Whether C/T SOL Are Still Being Taught

C/T SOL Still Being Taught		Yes	No
Pre *SOL*	Frequency	85	80
	Percent	51.5%	48.5%
SOL Only	Frequency	49	34
	Percent	59.0%	41.0%

$\chi^2 = .973$. $p = .324$.

Cross tabulations of responses between teachers with perceived high and low levels of lower socio-economic status students in their classrooms presented in Table 91show that nearly sixty percent (58.7%, $n = 37$) of the teachers with high levels of lower SES students felt that the *C/T SOL* were not being taught, while only 48.8% ($n = 39$) of the Low Level SES teachers agreed with them. Chi square analysis indicated a significant difference ($p = .010$) in the perceptions of these groups.

Table 91

Teacher Response by Perceived Levels of Lower SES Students to Whether C/T SOL Are Still Being Taught

C/T SOL Still Being Taught	Perceived Levels of Lower SES Students		Yes	No
	Low Level	Frequency	41	39
		Percent	51.3%	48.8%
	Middle Level	Frequency	56	29
		Percent	65.9%	34.1%
	High Level	Frequency	26	37
		Percent	41.3%	58.7%

$\chi^2 = 9.183$. $^{**}p = .010$.

This question was followed by the open-ended prompt, "Why do you think so?" as a means to gain additional insight into this issue. Of those indicating they felt the *C/T SOL* were still being taught despite not being assessed, 47 responses (35.1%) related to the continued focus on the use of technology in instruction. Comments similar to "I think the computer/technology standards of learning are incorporated into the lessons the students are doing in the computer lab," and, "We still have a huge push to integrate technology into our curriculum" were common.

Of those who felt the *C/T SOL* were not being taught, 32 responses (28.1%) dealt with the issue of time constraints placed on teachers due to those *SOL* that were being assessed. Comments similar to "Not enough time to teach those skills," and, "Not enough time to fit it in. That's sad, they need to be included in this age of technology" were common.

In addition to time constraints, 29 responses (25.4%) related to the focus of instruction being placed on those areas that are being tested. Comments similar to "Not to the extent because the concentration is put on teaching what is being tested," and, "Not to the degree that they once were when students had to take the technology *SOL* test" were common. At least one teacher lamented that, "Students know much less than they previously did in past years concerning computers."

*Response to Question 12: If the **2004 - 2005 fifth or eighth grade students in your school were tested using the Virginia Computer/Technology SOL exam, would they perform better, worse, or about the same as the fifth or eighth grade students who took the exam in 2002?***

As shown in Table 92, just under one-third of the teachers who responded (32.7%, $n = 90$) believed that the 2004 – 2005 fifth and eighth grade students would score about the same on the 2002 *C/T SOL* test as those students who took the test in 2002. Over twenty-eight percent (28.4%, $n = 78$) believed the 2004 – 2005 students would do worse on the test than the 2001 – 2002 group. Only 17.5% ($n = 48$) believed the 2005 students would perform better on the *C/T SOL* test.

Table 92

Teacher Response to How 2005 Fifth or Eighth Grade Students Would Perform as Compared to 2002 Students on the C/T SOL Test

04-05 vs. 01-02 Student Performance on *C/T SOL* Test	Frequency	Percent
Better	48	17.5%
About the Same	90	32.7%
Worse	78	28.4%
No Response	59	21.5%
Total	275	100.0%

Cross tabulations of responses between elementary and middle school teachers shown in Table 93 indicate that thirty-seven percent of the middle school teachers ($n = 27$) felt that the 2005 students would score better than the 2002 group on the *C/T SOL* test, while less than half that percentage of elementary teachers (14.7%, $n = 21$) felt the same way. Nearly half of the elementary teachers (46.2%, $n = 66$) believed that the 2005 group would perform worse, while only 16.4% ($n = 12$) of the middle school teachers agreed with them. Chi square analysis indicated a significant difference ($p = .000$) in the perceptions of these groups.

Table 93

Teacher Response by Teaching Level to How 2005 Fifth or Eighth Grade Students Would Perform as Compared to 2002 Students on the C/T SOL Test

04-05 vs. 01-02 Student Performance on *C/T SOL* Test		Better	About the Same	Worse
Elementary	Frequency	21	56	66
	Percent	14.7%	39.2%	46.2%
Middle	Frequency	27	34	12
	Percent	37.0%	46.6%	16.4%

$\chi^2 = 23.271$. $^{**}p = .000$.

Cross tabulations between categories of teachers with Pre *SOL* teaching experience and those with *SOL* Only shown in Table 94 demonstrated no salient differences.

Table 94

Teacher Response by SOL Experience to How 2005 Fifth or Eighth Grade Students Would Perform as Compared to 2002 Students on the C/T SOL Test

04-05 vs. 01-02 Student Performance on *C/T SOL* Test		Better	About the Same	Worse
Pre *SOL*	Frequency	31	59	54
	Percent	21.5%	41.0%	37.5%
SOL Only	Frequency	16	31	22
	Percent	23.2%	44.9%	31.9%

$\chi^2 = .643$. $p = .725$.

Cross tabulations of responses between teachers with perceived high and low levels of lower socio-economic status students in their classrooms presented in Table 95 show that just under thirty-nine percent (38.7%, $n = 24$) of the teachers with high levels of lower SES students felt that the 2005 students would perform worse on the *C/T SOL* test than those of 2002, while only 27.8% ($n = 22$) of the Low Level SES teachers agreed with them.

Table 95

Teacher Response by Perceived Levels of Lower SES Students to How 2005 Fifth or Eighth Grade Students Would Perform as Compared to 2002 Students on the C/T SOL Test

04-05 vs. 01-02 Student Performance on *C/T SOL* Test	Perceived Levels of Lower SES Students		Better	About the Same	Worse
	Low Level	Frequency	23	34	22
		Percent	29.1%	43.0%	27.8%
	Middle Level	Frequency	9	23	28
		Percent	15.0%	38.3%	46.7%
	High Level	Frequency	13	25	24
		Percent	21.0%	40.3%	38.7%

$\chi^2 = 6.672$. $p = .154$.

This question was followed by the open-ended prompt, "Why do you think so?" as a means to gain additional insight into this issue. Of those teachers indicating they felt the 2005 students would score about the same as those of 2002 on the *C/T SOL* test, over one-fifth (22.2%, $n = 20$) believed it was due to greater access to and availability of technology. Comments like "Daily use of computers," and, "We use the technology here often" were common.

Over forty percent of the comments (41%, $n = 32$) from teachers who believed the 2005 scores would be worse than those of 2002 related to the focus of instruction moving away from

computer/technology. Many comments included statements similar to "Not taught the way it was several years ago," or "The definitions and technology experiences are not emphasized." One teacher wrote, "There is not as much emphasis on teaching the *SOL*, therefore it is only taught when there is adequate time - after other *SOL*s are covered."

Fifteen percent (15.4%, $n = 12$) of the teacher comments from those who felt the 2005 scores would be worse centered on the time constraints caused by the requirements of *SOL* testing. "No time for specific instruction as in past years," wrote one teacher. Another commented that, "Less time has been spent focusing on computer technology due to emphasis on core *SOL*."

Of the teachers who felt that the 2005 student scores would be better than those of the 2002 group, 37.5% ($n = 18$) cited greater access to and availability of technology at home and at school. Regarding access to technology, teachers wrote comments similar to "More exposure to computers. Home, school, public areas, libraries, etc." One stated that, "Students are exposed to many technology related activities throughout the school year." "In three years, there have been strides in technology and students appear to have kept up" wrote another.

*Response to question 13: Do you believe the **2004 – 2005 eighth grade students' scores on the Computer/Technology SOL test would be better, worse, or about the same as they were when they took the test as fifth graders** in 2002?*

As shown in Table 96, just under one-third of the teachers who responded (32.7%, $n = 90$) believed that the 2004 – 2005 eighth grade students would score about the same on the *C/T SOL* test as they did when they took the test as fifth graders in 2002. Twenty-four percent ($n = 66$) believed the 2004 – 2005 eighth graders would do better on the test. Only 13.8% ($n = 38$) believed the 2005 students would perform worse on the *C/T SOL* test than they did as fifth graders in 2002. A large percentage of teachers (29.5%, $n = 81$) chose not to respond to the question.

Table 96

Teacher Response to How 2005 Eighth Graders' C/T SOL Scores Would Compare With Their Scores as Fifth Graders in 2002

04-05 8th vs. 01-02 5th Student Performance on *C/T SOL* Test	Frequency	Percent
Better	66	24.0%
About the Same	90	32.7%
Worse	38	13.8%
No Response	81	29.5%
Total	275	100.0%

Chi square analysis indicated a significant difference ($p = .024$) in the responses between elementary and middle school teachers. Cross tabulations shown in Table 97 indicate that over

forty-six percent of the middle school teachers (46.4%, *n* = 32) felt that the 2005 students would score better on the *C/T SOL* test as eighth graders than they did as fifth graders in 2002, while only 27.2% percent of elementary teachers (*n* = 34) felt the same way. Over one-half of the elementary teachers (50.4%, *n* = 63) believed that the 2002 fifth grade group would perform about the same as eighth graders, while only 39.1% (*n* = 27) of the middle school teachers agreed with them. Elementary teachers (22.4%, *n* = 28) were also slightly more inclined to predict that the 2002 fifth graders would do worse on the *C/T SOL* test as eighth graders than were the middle school teachers (14.5%, *n* = 10).

Table 97

Teacher Response by Teaching Level to How 2005 Eighth Graders' C/T SOL Scores Would Compare With Their Scores as Fifth Graders in 2002

04-05 8th vs. 01-02 5th Student Performance on *C/T SOL* Test		Better	About the Same	Worse
Elementary	Frequency	34	63	28
	Percent	27.2%	50.4%	22.4%
Middle	Frequency	32	27	10
	Percent	46.4%	39.1%	14.5%

$\chi^2 = 7.442$. **p* = .024.

Cross tabulations of responses between categories of teachers with teaching experience prior to the implementation of *SOL* testing and those with *SOL* only shown in Table 98 indicate that over thirty-six percent of the Pre *SOL* teachers (36.8%, *n* = 50) felt that the 2005 students would score better on the *C/T SOL* test as eighth graders than they did as fifth graders in 2002. Just over twenty-eight percent of *SOL* Only teachers (28.6%, *n* = 16) felt the same way.

Twenty-five percent of the *SOL* Only teachers (25.0%, *n* = 14) believed that the 2002 fifth grade group would perform worse as eighth graders, while only 16.9% (*n* = 23) of the Pre *SOL* teachers agreed with them.

Table 98

Teacher Response by SOL Experience to How 2005 Eighth Graders' C/T SOL Scores Would Compare With Their Scores as Fifth Graders in 2002

04-05 8th vs. 01-02 5th Student Performance on *C/T SOL* Test		Better	About the Same	Worse
Pre *SOL*	Frequency	50	63	23
	Percent	36.8%	46.3%	16.9%
SOL Only	Frequency	16	26	14
	Percent	28.6%	46.4%	25.0%

$\chi^2 = 21.21$. $p = .346$.

Cross tabulations of responses between teachers with perceived high and low levels of lower socio-economic status students in their classrooms as presented in Table 99 show that nearly forty-three percent (42.9%, $n = 30$) of the teachers with low levels of lower SES students felt that the 2005 students would perform better as eighth graders on the *C/T SOL* test than they did in 2002 as fifth graders. Only 27.6% ($n = 16$) of teachers with perceived high levels of lower SES students felt the same way.

Just over twenty-seven percent of High Level SES teachers (27.6%, $n = 16$) felt students would perform worse as eighth graders, while only 14.3% ($n = 10$) of Low Level SES teachers agreed.

Table 99

Teacher Response by Perceived Levels of Lower SES Students to How 2005 Eighth Graders' C/T SOL Scores Would Compare With Their Scores as Fifth Graders in 2002

04-05 8th vs. 01-02 5th Student Performance on *C/T SOL* Test	Perceived Levels of Lower SES Students		Better	About the Same	Worse
	Low Level	Frequency	30	30	10
		Percent	42.9%	42.9%	14.3%
	Middle Level	Frequency	17	27	9
		Percent	32.1%	50.9%	17.0%
	High Level	Frequency	16	26	16
		Percent	27.6%	44.8%	27.6%

$\chi^2 = 5.852$. $p = .210$.

This question was followed by the open-ended prompt, "Why do you think so?" as a means to gain additional insight into this issue. Of those teachers indicating they felt the 2005 eighth grade students would score about the same as they did as fifth graders in 2002 on the *C/T SOL* test, over fifteen percent (15.5%, $n = 14$) believed it was due to greater access to and availability of technology. One teacher wrote, "Students have more access to technology than they did in

homes. That should help." Another teacher added, "Teachers are scheduling computer lab sessions to insure students remain computer knowledgeable."

Over forty percent of the teachers (40.9%, *n* = 27) who felt the 2005 students would do better as eighth graders also cited greater access to and availability of technology as the reason. Comments similar to "They use technology daily either at home or at school" were common. One teacher wrote, "They continue to receive technology exposure, instruction and application in their regular classes." Another teacher stated, "The students that I observed seemed more comfortable and seemed to like using computers more than ever."

Of the teachers who indicated they felt the 2005 eighth grade students would not perform as well on the *C/T SOL* test, over one-third (34.2%, *n* = 13) believed it was due to the lack of instruction on the technology standards. Many teachers provided comments similar to "It is no longer taught," and, "They probably have not used them as much, especially since no longer being taught."

An additional ten percent of the respondents (10.2%, *n* = 4) who felt the 2005 eighth grade students would do worse felt the lack of time due to the constraints of the *SOL* testing was to blame. "Less time has been spent focusing on computer technology due to emphasis on core *SOL*" was one teacher's reason, and another cited, "No time for specific instruction as in past years."

Response to question 14: If the 2004 – 2005 eighth grade students were tested using the Virginia Computer/Technology SOL exam, ***would students who qualify for free and reduced lunch score better, worse, or about the same as their grade level peers****?*

As presented in Table 100, 37.1% (*n* = 102) believed that the 2004 – 2005 students who qualify for free and reduced lunch would score about the same on the *C/T SOL* test as their grade level peers. Over thirty-six percent (36.4%, *n* = 100) believed the 2004 – 2005 lower socio-economic status students would score worse on the test. Only 4.4% (*n* = 12) believed the lower SES students would perform better on the *C/T SOL* test.

Table 100

Teacher Response to How 2005 Lower SES Students' Scores on the C/T SOL Test Would Compare With Their Peers

04-05 Lower SES Students vs. Peer Performance on *C/T SOL* Test	Frequency	Percent
Better	12	4.4%
About the Same	102	37.1%
Worse	100	36.4%
No Response	61	22.2%
Total	275	100.0%

Cross tabulations of responses between elementary and middle school teachers shown in Table 101 indicate that over fifty-two percent of the elementary school teachers (52.1%, $n = 73$) felt that the 2005 free and reduced lunch students would score about the same on the *C/T SOL* test as their grade level peers, while less than forty percent of the middle school teachers ($n = 29$) felt the same way. Only 43.6% of the elementary teachers ($n = 61$) believed that the lower SES group would not perform as well as their classmates, while over fifty-two percent (52.7%, $n = 27$) of the middle school teachers felt they would do worse.

Table 101

Teacher Response by Teaching Level to How 2005 Lower SES Students' Scores on the C/T SOL Test Would Compare With Their Peers

04-05 Lower SES Students vs. Peer Performance on *C/T SOL* Test		Better	About the Same	Worse
Elementary	Frequency	6	73	61
	Percent	4.3%	52.1%	43.6%
Middle	Frequency	6	29	39
	Percent	8.1%	39.2%	52.7%

$\chi^2 = 3.830$. $p = .147$.

Cross tabulations between categories of teachers with Pre *SOL* teaching experience and those with *SOL* Only shown in Table 102 demonstrated no salient differences.

Table 102

Teacher Response by SOL Experience to How 2005 Lower SES Students' Scores on the C/T SOL Test Would Compare With Their Peers

04-05 Lower SES Students vs. Peer Performance on *C/T SOL* Test		Better	About the Same	Worse
Pre *SOL*	Frequency	9	68	68
	Percent	6.2%	46.9%	46.9%
SOL Only	Frequency	3	33	30
	Percent	4.5%	50.0%	45.5%

$\chi^2 = .332$. $p = .847$.

Cross tabulations of responses between teachers with perceived high and low levels of lower socio-economic status students in their classrooms presented in Table 103 show that half of the teachers with high levels of lower SES students (50.0%, $n = 33$) felt that these same students would perform worse than their peers on the *C/T SOL* test. Only 43.6% of teachers with perceived low levels of lower SES students ($n = 34$) felt the same way.

Table 103

Teacher Response by Perceived Levels of Lower SES Students to How 2005 Lower SES Students' Scores on the C/T SOL Test Would Compare With Their Peers

04-05 Lower SES Students vs. Peer Performance on *C/T SOL* Test	Perceived Levels of Lower SES Students		Better	About the Same	Worse
	Low Level	Frequency	6	38	34
		Percent	7.7%	48.7%	43.6%
	Middle Level	Frequency	2	28	26
		Percent	3.6%	50.0%	46.4%
	High Level	Frequency	3	30	33
		Percent	4.5%	45.5%	50.0%

$\chi^2 = 1.630$. $p = .803$.

This question was also followed by the open-ended prompt, "Why do you think so?" as a means to gain additional insight into this issue. Of those teachers indicating they felt the students who qualify for free and reduced lunch would score about the same as their peers on the *C/T SOL* test, over fifteen percent (15.7%, $n = 115$) believed it was due to greater access to and availability of technology. "Students have a great amount of exposure to computers now," stated one respondent. Another teacher wrote, "They all get the same instruction."
Fifty-nine percent ($n = 59$) of the respondents who indicated they felt that the lower SES students would not perform as well as their grade level peers believed it was due to the lack of access to and availability of technology. Comments similar to "Many of these students do not have access to computers at home," and "Not as much exposure to technology at home" were numerous. One teacher wrote, "They would lack access and experiences that school technology lessons used to provide."

Another eight percent (n = 8) of teachers who felt the lower SES students would perform worse indicated they felt less time on technology and more focus on core *SOL* were at fault. One respondent stated, "Time on other *SOL*s" as a reason. "They had more technology experiences when technology was tested," wrote another.

Of those teachers who felt the lower SES students would perform better, one-third (33.3%, $n = 4$) felt access to and availability of technology was the reason. One respondent commented, "Using computers at school, I would say better even if they didn't have one at home."

Response to question 15: If the 2004 – 2005 eighth grade students were tested using the Virginia Computer/Technology Standards of Learning exam, ***would students who qualify for free and reduced lunch score better, worse, or about the same as when they took the test as fifth graders in 2002****?*

As presented in Table 15, 32% of the respondents (n = 88) believed that the 2004 – 2005 eighth grade students who qualify for free and reduced lunch would score about the same on the *C/T SOL* test as they did as fifth graders in 2002. Over one-fifth of teachers (22.2%, n = 61) believed the 2005 eighth grade lower socio-economic status students would score worse on the test. Only 12% (n = 33) believed the lower SES students would perform better as eighth graders than as fifth graders on the *C/T SOL* test.

Table 104

Teacher Response to How 2005 Lower SES Eighth Graders' C/T SOL Scores Would Compare With Their Scores as Fifth Graders in 2002

04-05 8th Grade Lower SES Scores vs. Their 01-02 5th Scores on *C/T SOL* Test	Frequency	Percent
Better	33	12.0%
About the Same	88	32.0%
Worse	61	22.2%
No Response	93	33.8%
Total	275	100.0%

Chi square analysis indicated a significant difference (p = .000) in the responses of elementary and middle school teachers. Cross tabulations shown in Table 105 indicate that over one-half of the elementary school teachers (53.9%, n = 62) felt that the 2005 eighth grade free and reduced lunch students would score about the same on the *C/T SOL* test as they did as fifth graders, while only 38.8% of middle school teachers who responded (n = 26) felt the same way.

While over one-third of the middle school teachers (34.3%, n = 23) felt the 2005 eighth graders would do better than they did as fifth graders, only 8.7% (n = 10) of the elementary teachers agreed with them.

Table 105

Teacher Response by Teaching Level to How 2005 Lower SES Eighth Graders' C/T SOL Scores Would Compare With Their Scores as Fifth Graders in 2002

04-05 8th Grade Lower SES Scores vs. Their 01-02 5th Scores on *C/T SOL* Test		Better	About the Same	Worse
Elementary	Frequency	10	62	43
	Percent	8.7%	53.9%	37.4%
Middle	Frequency	23	26	18
	Percent	34.3%	38.8%	26.9%

$\chi^2 = 18.738$. $^{**}p = .000$.

Cross tabulations between categories of teachers with Pre *SOL* teaching experience and those with *SOL* Only indicated that 38.9% ($n = 21$) of the *SOL* Only teachers felt the lower SES students would perform worse as eighth grade students on the eighth grade test. Only 30.7% ($n = 39$) of the Pre *SOL* teachers felt the same.

Table 106

Teacher Response by SOL Experience to How 2005 Lower SES Eighth Graders' C/T SOL Scores Would Compare With Their Scores as Fifth Graders in 2002

04-05 8th Grade Lower SES Scores vs. Their 01-02 5th Scores on *C/T SOL* Test		Better	About the Same	Worse
Pre *SOL*	Frequency	26	62	39
	Percent	20.5%	48.8%	30.7%
SOL Only	Frequency	7	26	21
	Percent	13.0%	48.1%	38.9%

$\chi^2 = 1.940$. $p = .379$.

Cross tabulations of responses between teachers with perceived high and low levels of lower socio-economic status students in their classrooms presented in Table 107 show that over twenty-eight percent of the teachers with low levels of lower SES students (28.8%, $n = 19$) felt that these same 2005 eighth grade students would perform better on the *C/T SOL* test than they did as fifth graders. Only 11.1% of teachers with perceived high levels of lower SES students ($n = 6$) felt the same way. Chi square analysis indicated a significant difference ($p = .023$) in the perceptions of the two groups.

Over forty-two percent of High Level SES teachers (42.6%, $n = 23$) felt these students would perform worse as eighth graders in 2005, while just 31.8% ($n = 21$) of Low Level SES teachers agreed.

Table 107

Teacher Response by Perceived Levels of Lower SES Students to How 2005 Lower SES Eighth Graders' C/T SOL Scores Would Compare With Their Scores as Fifth Graders in 2002

04-05 8th Grade Lower SES Scores vs. Their 01-02 5th Scores on *C/T SOL* Test	Perceived Levels of Lower SES Students		Better	About the Same	Worse
	Low Level	Frequency	19	26	21
		Percent	28.8%	39.4%	31.8%
	Middle Level	Frequency	6	30	13
		Percent	12.2%	61.2%	26.5%
	High Level	Frequency	6	25	23
		Percent	11.1%	46.3%	42.6%

$\chi^2 = 11.381$. $*p = .023$.

This question was also followed by the open-ended prompt, "Why do you think so?" as a means to gain additional insight into this issue. Of those teachers indicating they felt the 2005 eighth grade students who qualify for free and reduced lunch would score about the same as they did as fifth graders on the *C/T SOL* test, nearly one-fourth (24.2%, $n = 8$) believed it was due to greater access to and availability of technology. "Access to computers at home," and "Because we use technology every day," are two examples of written comments. Another teacher explained, "Students have a great amount of exposure to computers now."

Of the respondents who felt the 2005 eighth graders would do better on the *C/T SOL* than they did as fifth graders, 15.9% ($n = 14$) also cited greater access to and availability of technology. As one teacher stated, "More and more of them are getting computers and internet access at home." Another respondent wrote, "More funding goes to schools with at risk students. I have never been in a school with so much technology available to students and faculty."

Over thirty-nine percent of the respondents (39.4%, $n = 26$) who indicated they felt that the lower SES students would not perform as well as eighth graders as they did in fifth grade, believed it was due to the lack of access to and availability of technology. "Many do not have much if any access to computers outside of school," wrote one respondent. Another wrote, "Without access at home and less instruction at school they would not be able to maintain and further their skills. (If you don't use it you lose it)."

Response to question 16: Please indicate your degree of agreement with each of the following items.

Respondents were asked to use a Likert-type four point scale to rate the extent to which they agreed with a series of six statements. Teachers circled the appropriate number on the scale with 1 signifying they strongly disagree with the statement and a 4 signifying they strongly agreed with the statement.

Testing creates pressure on teachers for students to perform well

As presented in Table 108, over three-fourths of the teachers (77.1%, *n* = 212) strongly agreed that testing puts pressure on teachers for students to perform well. When combined, less than six percent (5.4%, *n* = 15) of the respondents disagreed with the statement.

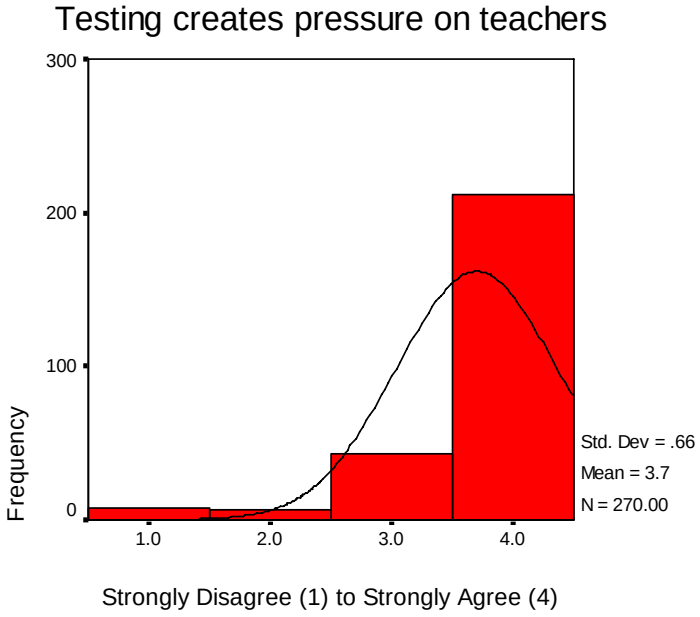
Table 108

Teacher Response to Whether Testing Creates Pressure on Teachers for Students to Perform Well

	Testing creates pressure on teachers						
	Strongly Disagree 1	2	3	Strongly Agree 4	Total	No Response	Total
Frequency	8	7	43	212	270	5	275
Percent	2.9%	2.5%	15.6%	77.1%	98.2%	1.8%	100.0%

Figure 9 displays the response frequency for all teachers regarding the statement that testing creates pressure on teachers for students to perform well.

Figure 9



Cross tabulations between elementary and middle school teachers shown in Table 109 demonstrated no salient differences. There were similar findings in the cross tabulations of the response frequencies and percentages between the categories of Pre *SOL* and *SOL* Only teachers shown in Table 110 and High SES Level and Low SES Level teachers shown in Table 111.

Table 109

Teacher Response by Teaching Level to Whether Testing Creates Pressure on Teachers for Students to Perform Well

Testing Creates Pressure on Teachers			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Level	Elementary	Frequency	6	2	32	139
		Percent	3.4%	1.1%	17.9%	77.7%
	Middle	Frequency	2	5	11	73
		Percent	2.2%	5.5%	12.1%	80.2%

$\chi^2 = 6.050$. $p = .109$.

Table 110

Teacher Response by SOL Experience to Whether Testing Creates Pressure on Teachers for Students to Perform Well

Testing Creates Pressure on Teachers		Strongly Disagree			Strongly Agree
		1	2	3	4
Teaching Experience Pre *SOL*	Frequency	5	5	29	141
	Percent	2.8%	2.8%	16.1%	78.3%
SOL Only	Frequency	3	2	14	67
	Percent	3.5%	2.3%	16.3%	77.9%

$\chi^2 = .145$. $p = .986$.

Table 111

Teacher Response by Perceived Level of Low SES Students to Whether Testing Creates Pressure on Teachers for Students to Perform Well

Testing Creates Pressure on Teachers			Strongly Disagree			Strongly Agree
			1	2	3	4
Perceived Levels of Lower SES Students	Low Level	Frequency	2	3	15	71
		Percent	2.2%	3.3%	16.5%	78.0%
	Middle Level	Frequency	2	1	11	54
		Percent	2.9%	1.5%	16.2%	79.4%
	High Level	Frequency	2	3	12	69
		Percent	2.3%	3.5%	14.0%	80.2%

$\chi^2 = .972$. $p = .987$.

The curriculum I teach has been narrowed due to SOL testing

As presented in Table 112, over half of the teachers who responded (54.5%, *n* = 150) strongly agreed that the curriculum has been narrowed. When combined, only 18.9% of teachers (*n* = 52) of the respondents disagreed with the statement.

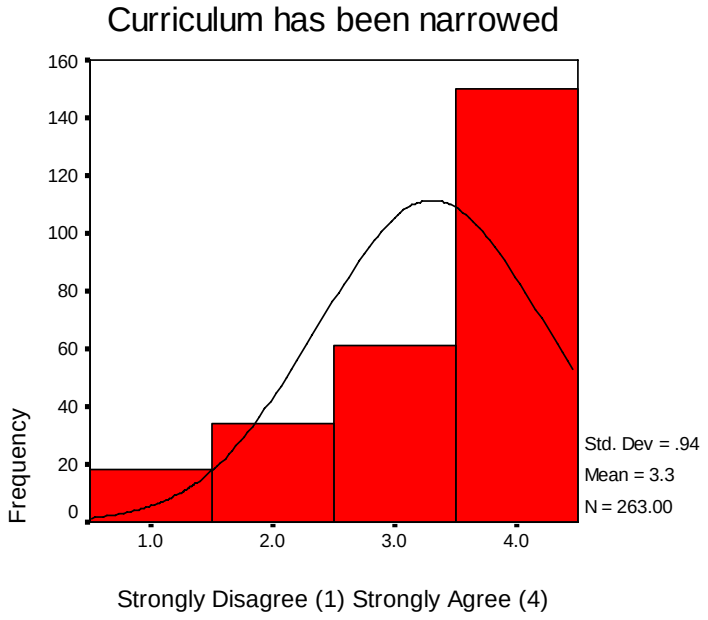
Table 112

Teacher Response to Whether the Curriculum Has Been Narrowed Due to SOL Testing

	Curriculum has been narrowed due to testing						
	Strongly Disagree 1	2	3	Strongly Agree 4	Total	No Response	Total
Frequency	18	34	61	150	263	12	275
Percent	6.5%	12.4%	22.2%	54.5%	95.6%	4.4%	100.0%

Figure 10 displays the response frequency for all teachers regarding the statement that the curriculum has been narrowed due to *SOL* testing.

Figure 10



As shown in Table 113, cross tabulations between teaching levels indicated that, when combined, more than eighty percent of the elementary school teachers (82.4%, *n* = 145) felt that the curriculum had narrowed due to testing, while 75.8% (*n* = 65) of the middle school teachers felt the same. Over eleven percent of the middle teachers (11.5%, *n* = 10) strongly disagreed with the statement as compared to 4.5% (*n* = 8) of the elementary school teachers who indicated the same.

Table 113

Teacher Response Teaching Level to Whether the Curriculum Has Been Narrowed Due to SOL Testing

Curriculum has been narrowed due to testing			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Level	Elementary	Frequency	8	23	46	99
		Percent	4.5%	13.1%	26.1%	56.3%
	Middle	Frequency	10	11	15	51
		Percent	11.5%	12.6%	17.2%	58.6%

$\chi^2 = 6.195$. $p = .104$.

Cross tabulations of the frequencies and percentages between the categories of Pre *SOL* and *SOL* Only teachers found in Table 114 and High Level SES and Low Level SES teachers found in Table 115 produced no salient differences.

Table 114

Teacher Response by SOL Experience to Whether the Curriculum Has Been Narrowed Due to SOL Testing

Testing Creates Pressure on Teachers		Strongly Disagree			Strongly Agree
		1	2	3	4
Teaching Experience Pre *SOL*	Frequency	11	22	40	102
	Percent	6.3%	12.6%	22.9%	58.3%
SOL Only	Frequency	5	12	20	47
	Percent	6.0%	14.3%	23.8%	56.0%

$\chi^2 = .213$. $p = .975$.

Table 115

Teacher Response by Perceived Level of Low SES Students to Whether the Curriculum Has Been Narrowed Due to SOL Testing

Testing Creates Pressure on Teachers			Strongly Disagree			Strongly Agree
			1	2	3	4
Perceived Levels of Lower SES Students	Low Level	Frequency	7	14	19	49
		Percent	7.9%	15.7%	21.3%	55.1%
	Middle Level	Frequency	5	5	18	40
		Percent	7.4%	7.4%	26.5%	58.8%
	High Level	Frequency	3	10	22	48
		Percent	3.6%	12.0%	26.5%	57.8%

$\chi^2 = 4.376$. $p = .626$.

My students demonstrate adequate computer/technology skills

As shown in Table 116, over sixty percent of the teachers who responded (62.9%, $n = 173$) agreed or strongly agreed that their students demonstrate adequate computer/technology skills. Just over five percent of teachers (5.5%, $n = 15$) strongly disagreed with the statement.

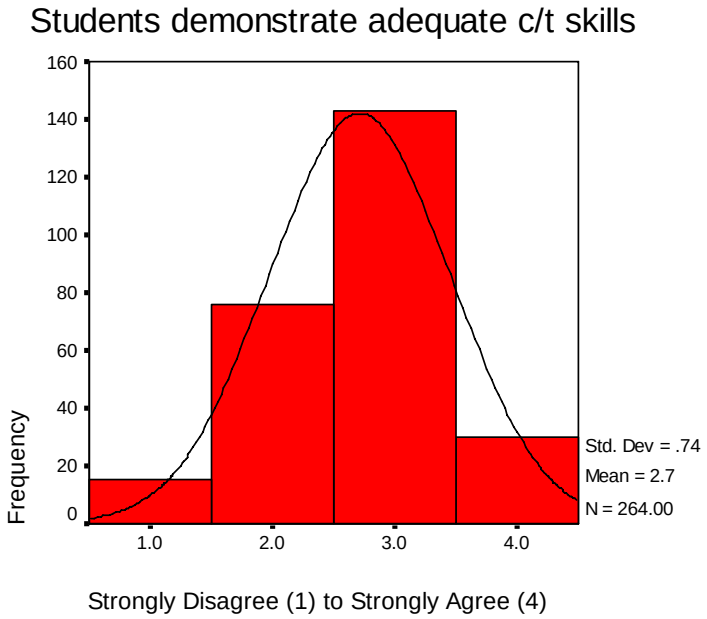
Table 116

Teacher Response to Whether Students Demonstrate Adequate C/T Skills

	Students Demonstrate Adequate C/T Skills						
	Strongly Disagree			Strongly Agree			
	1	2	3	4	Total	No Response	Total
Frequency	15	76	143	30	264	11	275
Percent	5.5%	27.6%	52.0%	10.9%	96.0%	4.0%	100.0%

Figure 11 displays the response frequency for all teachers regarding the statement that students demonstrate adequate computer/technology skills.

Figure 11



As shown in Table 117, cross tabulations between teaching levels indicated that, when combined, just under forty percent of the elementary school teachers (39.5%, *n* = 70) felt their students did not demonstrate adequate skills, while just 24.1% (*n* = 21) of the middle school teachers felt the same. Over seventy five percent of the middle school teachers (75.9 %, *n* = 66) agreed with the statement as compared to 60.4% (*n* = 107) of the elementary school teachers who indicated the same. Chi square analysis indicated a significant difference (*p* = .008) in the perceptions of the two groups.

Table 117

Teacher Response by Teaching Level to Whether Students Demonstrate Adequate C/T Skills

Students Demonstrate Adequate C/T Skills			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Level	Elementary	Frequency	8	62	91	16
		Percent	4.5%	35.0%	51.4%	9.0%
	Middle	Frequency	7	14	52	14
		Percent	8.0%	16.1%	59.8%	16.1%

χ^2 = 11.847. **p = .008.

As presented in Table 118, cross tabulations between teachers with experience prior to *SOL* testing and those with none indicated that, when combined, over seventy percent of the *SOL* Only teachers (71.7%, *n* = 61) believed that their students demonstrated adequate computer/technology skills compared to just 62.9% (*n* = 111) of the Pre *SOL* teachers who felt the same.

Table 118

Teacher Response by SOL Experience to Whether Students Demonstrate Adequate C/T Skills

Students Demonstrate Adequate C/T Skills		Strongly Disagree			Strongly Agree
		1	2	3	4
Teaching Experience Pre *SOL*	Frequency	11	54	91	19
	Percent	6.3%	30.9%	52.0%	10.9%
SOL Only	Frequency	4	20	50	11
	Percent	4.7%	23.5%	58.8%	12.9%

$\chi^2 = 2.033$. $p = .566$.

As illustrated in Table 119, cross tabulations between categories of teachers with perceived high and low levels of lower socio-economic status students indicated that, when combined, over forty-eight percent of the High Level SES teachers (48.1%, $n = 40$) did not feel that their students demonstrated adequate computer/technology skills compared to just 27.3% ($n = 24$) of the Low Level SES teachers who felt the same. Nearly twenty percent (19.3%, $n = 17$) of the Low Level SES teachers strongly agreed with the statement as compared to just 8.4% ($n = 7$) of the High Level SES teachers. Chi square analysis indicated a significant difference ($p = .003$) in the perceptions of the two groups.

Table 119

Teacher Response by Perceived Level of Low SES Students to Whether Students Demonstrate Adequate C/T Skills

Students Demonstrate Adequate C/T Skills			Strongly Disagree			Strongly Agree
			1	2	3	4
Perceived Levels of Lower SES Students	Low Level	Frequency	3	21	47	17
		Percent	3.4%	23.9%	53.4%	19.3%
	Middle Level	Frequency	1	24	40	3
		Percent	1.5%	35.3%	58.8%	4.4%
	High Level	Frequency	9	31	36	7
		Percent	10.8%	37.3%	43.4%	8.4%

$\chi^2 = 20.204$. $^{**}p = .003$.

Removing the Computer/Technology SOL tests has resulted in students being taught less of this content

As shown in Table 120, when combined over half of the teachers who responded (52%, $n = 143$) moderately or strongly agreed that the removal of *C/T SOL* testing has resulted in students being taught less of that content.

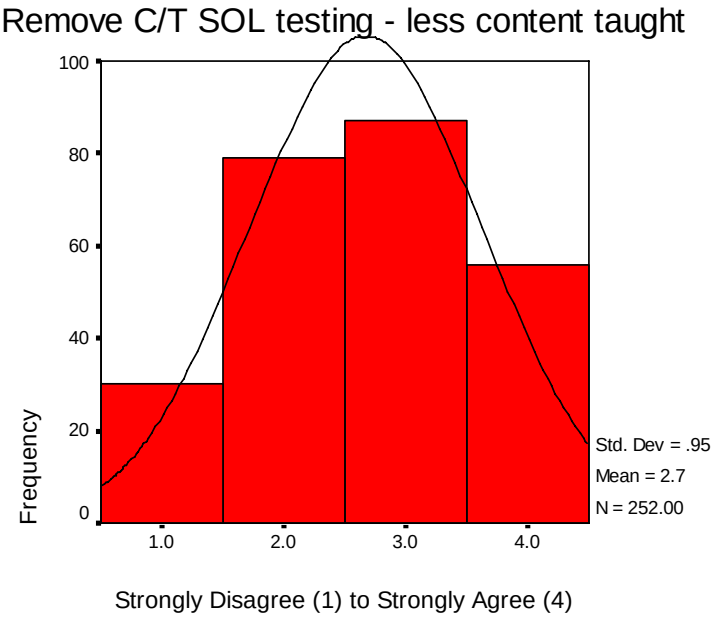
Table 120

Teacher Response to Whether Removing C/T SOL Tests Resulted in Less C/T Content Being Taught

	Removing *C/T SOL* tests - less content taught						
	Strongly Disagree			Strongly Agree			
	1	2	3	4	Total	No Response	Total
Frequency	30	79	87	56	252	23	275
Percent	10.9%	28.7%	31.6%	20.4%	91.6%	8.4%	100.0%

Figure 12 displays the response frequency for all teachers regarding the statement that removing the *C/T* Standards of Learning tests has resulted in students being taught less of this content.

Figure 12



As shown in Table 121, cross tabulations between teaching levels indicated that, when combined, over fifty-seven percent of the middle school teachers (57.6%, $n = 46$) felt the removal of the *C/T SOL* testing has not resulted in students being taught less of that content, while just 36.6% ($n = 63$) of the elementary teachers felt the same. Over one-quarter of the elementary school respondents (25.6%, $n = 44$) strongly agreed with the statement and felt that less computer/technology content was being taught. Chi square analysis indicated a significant difference ($p = .019$) in the perceptions of the two groups.

Table 121

Teacher Response by Teaching Level to Whether Removing C/T SOL Tests Resulted in Less C/T Content Being Taught

Removing *C/T SOL* tests - less content taught			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Level	Elementary	Frequency	17	46	65	44
		Percent	9.9%	26.7%	37.8%	25.6%
	Middle	Frequency	13	33	22	12
		Percent	16.3%	41.3%	27.5%	15.0%

$\chi^2 = 9.950$. **p* = .019.

As presented in Table 122, cross tabulations between teachers with experience prior to *SOL* testing and those without such experience indicated that, when combined, just under sixty percent of the Pre *SOL* teachers (59.1%, *n* = 98) believed that removing the *C/T SOL* tests has resulted in less of that content being taught compared to 51.3% (*n* = 42) of the *SOL* Only teachers who felt the same.

Table 122

Teacher Response by SOL Experience to Whether Removing C/T SOL Tests Resulted in Less C/T Content Being Taught

Removing *C/T SOL* tests - less content taught			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Experience	Pre *SOL*	Frequency	16	52	63	35
		Percent	9.6%	31.3%	38.0%	21.1%
	SOL Only	Frequency	13	27	24	18
		Percent	15.9%	32.9%	29.3%	22.0%

$\chi^2 = 3.056$. *p* = .383.

As illustrated in Table 123, cross tabulations between categories of teachers with perceived high and low levels of lower socio-economic status students indicated that, when combined, over sixty-four percent of the High Level SES teachers (64.2%, *n* = 50) moderately or strongly agreed that removal of the *C/T SOL* testing has resulted in less of that content being taught, compared to 54.0% (*n* = 47) of the Low Level SES teachers who felt the same. Just over seventeen percent (17.2%, *n* = 15) of the Low Level SES teachers strongly disagreed with the statement as compared to just 7.7% (*n* = 6) of the High Level SES teachers.

Table 123

Teacher Response by Perceived Levels of Lower SES Students to Whether Removing C/T SOL Tests Resulted in Less C/T Content Being Taught

Removing *C/T SOL* tests - less content taught			Strongly Disagree			Strongly Agree
			1	2	3	4
Perceived Levels of Lower SES Students	Low Level	Frequency	15	25	35	12
		Percent	17.2%	28.7%	40.2%	13.8%
	Middle Level	Frequency	6	22	21	16
		Percent	9.2%	33.8%	32.3%	24.6%
	High Level	Frequency	6	22	25	25
		Percent	7.7%	28.2%	32.1%	32.1%

$\chi^2 = 11.177$. $p = .083$.

The Computer/Technology Standards of Learning are still being taught despite not being tested

As shown in Table 124, when combined, nearly equal percentages of teachers who responded felt they moderately or strongly agreed (45.5%, $n = 125$) or moderately or strongly disagreed (43.7%, $n = 120$) that the *C/T SOL* are still being taught despite not being tested.

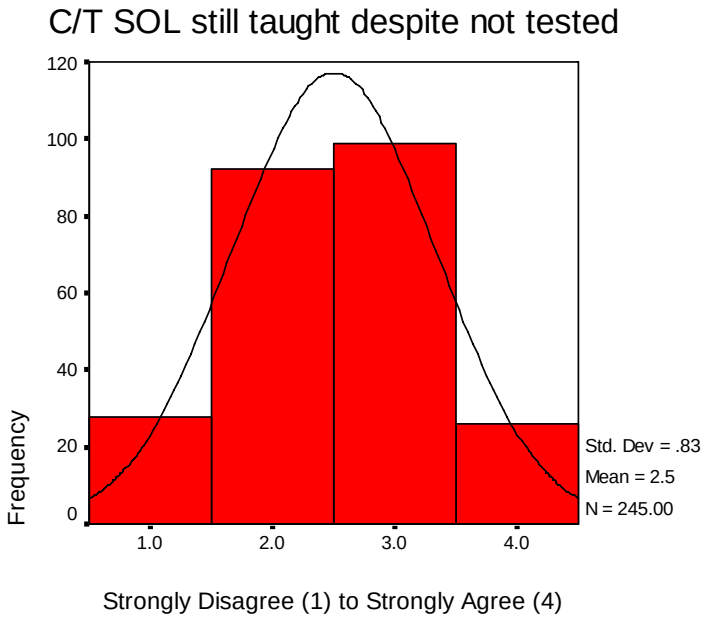
Table 124

Teacher Response to Whether C/T SOL Are Being Taught Despite Not Being Tested

	C/T SOL still taught despite not being tested						
	Strongly Disagree			Strongly Agree			
	1	2	3	4	Total	No Response	Total
Frequency	28	92	99	26	245	30	275
Percent	10.2%	33.5%	36.0%	9.5%	89.1%	10.9%	100.0%

Figure 13 displays the response frequency for all teachers regarding the statement that the *C/T SOL* are still being taught despite not being tested.

Figure 13



As illustrated in Table 125, cross tabulations between teaching levels indicated that, when combined, over sixty-three percent of the middle school teachers (63.6%, *n* = 49) felt the *C/T SOL* are still being taught even though they are not tested, while just 45.2% (*n* = 76) of the elementary teachers felt the same. Over fifteen percent of the elementary school respondents (15.5%, *n* = 26) strongly disagreed with the statement and felt that the *C/T SOL* were not being taught. Chi square analysis indicated a significant difference (*p* = .009) in the perceptions of the two groups.

Table 125

Teacher Response by Teaching Level to Whether C/T SOL Are Being Taught Despite Not Being Tested

C/T SOL still taught despite not being tested			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Level	Elementary	Frequency	26	66	60	16
		Percent	15.5%	39.3%	35.7%	9.5%
	Middle	Frequency	2	26	39	10
		Percent	2.6%	33.8%	50.6%	13.0%

χ^2 = 11.603. **p = .009.

As presented in Table 126, cross tabulations between teachers with experience prior to *SOL* testing and those with none indicated that, when combined, over fifty-eight percent of the *SOL* Only teachers (58.8%, *n* = 47) believed that the *C/T SOL* were still being taught compared to less than half of the Pre *SOL* teachers (46.5%, *n* = 42) who felt the same.

Table 126

Teacher Response by SOL Experience to Whether C/T SOL Are Being Taught Despite Not Being Tested

C/T SOL still taught despite not being tested			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Experience	Pre *SOL*	Frequency	19	67	59	16
		Percent	11.8%	41.6%	36.6%	9.9%
	SOL Only	Frequency	8	25	38	9
		Percent	10.0%	31.3%	47.5%	11.3%

$\chi^2 = 3.312$. $p = .346$.

As illustrated in Table 127, cross tabulations between categories of teachers with perceived high and low levels of lower socio-economic status students indicated that, when combined, slightly lower percentages of the High Level SES (51.3%, $n = 40$) than Low Level SES (58.4%, $n = 49$) teachers moderately or strongly agreed that the *C/T SOL* are still being taught despite not being tested.

Table 127

Teacher Response by Perceived Levels of Lower SES Students to Whether C/T SOL Are Being Taught Despite Not Being Tested

C/T SOL still taught despite not being tested			Strongly Disagree			Strongly Agree
			1	2	3	4
Perceived Levels of Lower SES Students	Low Level	Frequency	6	29	36	13
		Percent	7.1%	34.5%	42.9%	15.5%
	Middle Level	Frequency	12	25	22	5
		Percent	18.8%	39.1%	34.4%	7.8%
	High Level	Frequency	10	27	32	7
		Percent	13.2%	35.5%	42.1%	9.2%

$\chi^2 = 7.235$. $p = .300$.

Removing the Computer/Technology Standards of Learning has resulted in students knowing less of this content

As shown in Table 128, when combined, just under half of the teachers who responded indicated they moderately or strongly disagreed (49.8%, $n = 137$) that removing the *C/T SOL* test has resulted in students knowing less of this content.

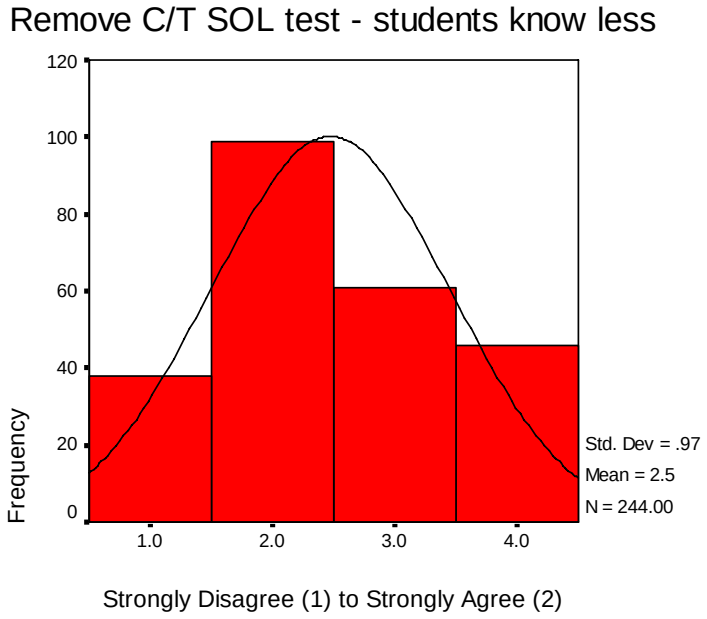
Table 128

Teacher Response to Whether Removing C/T SOL Test Has Resulted in Students Knowing Less of This Content

	Remove *C/T SOL* test – students know less						
	Strongly Disagree 1	2	3	Strongly Agree 4	Total	No Response	Total
Frequency	38	99	61	46	244	31	275
Percent	13.8%	36.0%	22.2%	16.7%	88.7%	11.3%	100.0%

Figure 14 displays the response frequency for all teachers regarding the statement that removing the *C/T SOL* has resulted in students knowing less of this content.

Figure 14



As illustrated in Table 129, cross tabulations between teaching levels indicated that, when combined, over sixty-six percent of the middle school teachers (66.3%, $n = 51$) felt the removal of *C/T SOL* testing has not resulted in students knowing less of that content, while just over half (51.5%, $n = 86$) of the elementary teachers felt the same. Over one-fifth of the elementary school respondents (21%, $n = 35$) strongly agreed with the statement and felt that removing the *C/T SOL* test has resulted in students knowing less of that content.

Table 129

Teacher Response by Teaching Level to Whether Removing C/T SOL Test Has Resulted in Students Knowing Less of This Content

Remove *C/T SOL test* – students know less			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Level	Elementary	Frequency	21	65	46	35
		Percent	12.6%	38.9%	27.5%	21.0%
	Middle	Frequency	17	34	15	11
		Percent	22.1%	44.2%	19.5%	14.3%

$\chi^2 = 6.027$. $p = .110$.

As presented in Table 130, cross tabulations between teachers with experience prior to *SOL* testing and those without such experience indicated that, when combined, just under sixty percent of the *SOL* Only teachers (59.5%, $n = 47$) disagreed that the removal of the *C/T SOL* test has resulted in students knowing less of this content. A majority of the Pre *SOL* teachers felt the same (55.2%, $n = 89$).

Table 130

Teacher Response by SOL Experience to Whether Removing C/T SOL Test Has Resulted in Students Knowing Less of This Content

Remove *C/T SOL* test – students know less			Strongly Disagree			Strongly Agree
			1	2	3	4
Teaching Experience	Pre *SOL*	Frequency	21	68	45	27
		Percent	13.0%	42.2%	28.0%	16.8%
	SOL Only	Frequency	16	31	15	17
		Percent	20.3%	39.2%	19.0%	21.5%

$\chi^2 = 4.257$. $p = .235$.

As illustrated in Table 131, cross tabulations between categories of teachers with perceived high and low levels of lower socio-economic status students indicated that, when combined, over fifty-seven percent of the teachers with low levels of lower SES students (57.2%, $n = 48$) moderately or strongly disagreed with the statement and felt that removing the *C/T SOL* test has not resulted in students knowing less of this content. Half of the High Level SES teachers (50.0%, $n = 38$) felt the same way.

Table 131

Teacher Response by Perceived Levels of Lower SES Students to Whether Removing C/T SOL Test Has Resulted in Students Knowing Less of This Content

Remove *C/T SOL* test – students know less			Strongly Disagree			Strongly Agree
			1	2	3	4
Perceived Levels of Lower SES Students	Low Level	Frequency	14	34	28	8
		Percent	16.7%	40.5%	33.3%	9.5%
	Middle Level	Frequency	8	29	11	15
		Percent	12.7%	46.0%	17.5%	23.8%
	High Level	Frequency	13	25	18	20
		Percent	17.1%	32.9%	23.7%	26.3%

$\chi^2 = 12.524$. $p = .051$.

Phase II - Student Testing

The purpose of the second phase of this research was to provide data to be used in conjunction with teachers' perceptions of whether or not state standards and accountability measures impact their instructional decisions and the curriculum. More specifically, this data would be used in comparison with survey items asking whether teachers felt the *C/T SOL* had or had not been de-emphasized.

Population and Sample

The *Virginia C/T SOL* exam was last administered in the host school division to fifth ($n = 625$) and eighth ($n = 641$) grade students in spring 2002. The test was given using paper and pencil. The student answer sheets were scanned by Harcourt Brace, the test creator, and the raw scores were stored electronically.

For this study, a population of all 2005 fifth ($n = 618$) and eighth ($n = 698$) grade students was selected. The students were located at eleven elementary sites and three middle school sites.

Instrumentation

Elementary School

During the second week in June of 2005, the elementary students were assessed using the fifth grade version of the 2002 *Virginia C/T SOL* test instrument. Classroom teachers served as monitors and the test was administered to fifth graders in all eleven elementary schools. The testing was conducted under the same guidelines and conditions as were in place for the same test in the spring of 2002. Six-hundred and eighteen test booklets with answer sheets were delivered to the schools. Five-hundred and eighty-three completed answer sheets and test booklets were collected and returned to the department for information technology at the school administration building for electronic scoring. The return rate for the test administration was 94.3%.

Middle School

The eighth grade version of the 2002 *Virginia C/T* SOL test was administered to all eighth grade students in three middle schools during the second week of June 2005. Testing took place under the same guidelines and conditions as were in place for the same test in spring of 2002. Six-hundred and ninety-eight test booklets and answer sheets were delivered to the schools. Five-hundred and twenty-two completed answer sheets and test booklets were collected and returned to the department for information technology at the school administration building for scoring. The return rate for the test administration was 74.8%.

Data Analysis

The answer sheets used for the test administration at both levels were preprinted with both the students' name and testing identification number prior to the test administration. The completed answer sheets were scanned and the students' raw scores stored electronically. This procedure captured the necessary data for the 2005 student data sets for both fifth and eighth grade. The fifth and eighth grade data sets from the 2002 test administration were provided in electronic format by Harcourt Brace.

Analysis of variance (ANOVA) is used to uncover the main and interaction effects of categorical independent variables called "factors" on an interval dependent variable. The univariate version of the general linear model was used in this study to perform an ANOVA on the testing data since it is used when there is one dependent variable and one or more independents (Fraenkel & Wallen, 2000).

The t-test is a parametric statistical test used to determine if the difference between the means of two samples is significant (Fraenkel & Wallen, 2000). The t-test for independent means was also used post hoc in this study because it is used to compare the mean scores of two different groups who have been tested only once.

Using the *Statistical Package for the Social Sciences (SPSS)* computer software and the raw scores retrieved from the 2002 and the 2005 fifth grade files, a series of univariate ANOVAs were completed. A significance level of $\alpha < .05$ was used for the computations. A similar series of ANOVAs were run using *SPSS* and the raw scores from the 2002 and 2005 eighth grade files. The significance level was also set at $\alpha < .05$. A repeated measures ANOVA was used on the scaled scores for the fifth grade to eighth grade cohort group who took the respective versions of the *C/T SOL* test in 2002 and then again in 2005.

Fifth Grade Results of Raw Score Comparison

The fifth grade version of the 2002 *Computer/Technology SOL* exam had a total of 30 multiple choice questions. As illustrated in Table 132, 625 raw scores from the 2002 fifth graders were compared with 583 raw scores from the 2005 fifth graders using a univariate ANOVA. The group statistics show the mean for the 2002 fifth graders was 22.31 correct answers, while the mean for the 2005 fifth graders was 20.18. The standard deviation (*SD*) was 5.3 for the 2002 fifth grade and 5.54 for the 2005 students.

Table 132

Descriptive Statistics for Fifth Grade Computer/Technology SOL Raw Scores

Year Tested	Socio-Economic Status	Mean	Std. Deviation	N
2002	Lower SES Students	20.53	5.08	286
	All Other Students	23.80	5.03	339
	Total	22.31	5.30	625
2005	Lower SES Students	17.78	5.35	260
	All Other Students	22.13	4.89	322
	Total	20.18	5.54	582
Total	Lower SES Students	19.22	5.38	546
	All Other Students	22.99	5.03	661
	Total	21.28	5.52	1207

Table 133 displays the tests of between-subjects effects using the fifth grade *C/T SOL* scores as the dependent variable. There was a significant difference found in the raw scores of the students who took the test in 2002 and those who were tested in 2005 ($p = .000$). The findings also indicate a significant difference in the scores between lower SES students and all others ($p = .000$). There was no significant difference in the gap between lower SES students and all other students between years tested ($p = .066$).

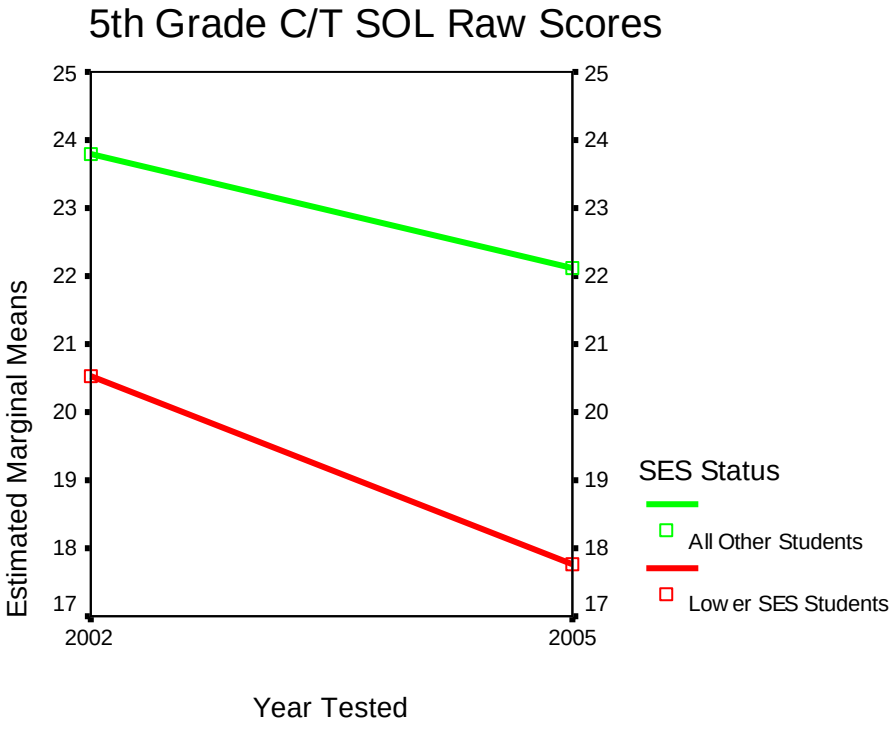
Table 133

Between Subjects Effects from Fifth Grade C/T SOL Test Raw Scores ANOVA

Source	Type III Sum of Squares	df	Mean Square	F	*p*
Corrected Model	5738.845	3	1912.948	74.259	.000
Year Tested	1464.472	1	1464.472	56.850	.000
SES Status	4335.255	1	4335.255	168.291	.000
Year Tested* SES Status	86.979	1	86.979	3.376	.066
Error	30989.816	1203	25.760		
Total	583434.000	1207			
Corrected Total	36728.661	1206			

Figure 15 displays the profile plot for the estimated marginal means for the fifth grade *C/T SOL* scores.

Figure 15



Eighth Grade Results of Raw Score Comparison

The eighth grade version of the 2002 *C/T SOL* exam had a total of 40 multiple choice questions. As illustrated in Table 134, 641 raw scores from the 2002 eighth graders were compared with 522 raw scores from the 2005 eighth graders using a univariate ANOVA. The group statistics show the mean for the 2002 eighth graders was 30.23 correct answers, while the mean for the 2005 eighth graders was 28.60. The *SD* was 7.14 for the 2002 eighth grade and 7.01 for the 2005 students.

Table 134

Descriptive Statistics for Eighth Grade Computer/Technology SOL Raw Scores

Year Tested	Socio-Economic Status	Mean	Std. Deviation	N
2002	Lower SES Students	27.30	6.74	102
	All Other Students	30.78	7.09	539
	Total	30.23	7.14	641
2005	Lower SES Students	24.56	6.73	173
	All Other Students	30.60	6.24	349
	Total	28.60	7.01	522
Total	Lower SES Students	25.58	6.85	275
	All Other Students	30.71	6.77	888
	Total	29.50	7.13	1163

Table 135 displays the tests of between-subjects effects using the eighth grade *C/T SOL* scores as the dependent variable. There was a significant difference found in the raw scores of the students who took the test in 2002 and those who were tested in 2005 ($p = .002$). The findings also indicate a significant difference in the scores between lower SES students and all others ($p = .000$). Unlike the fifth grade scores, there was a significant difference in the gap between eighth grade lower SES students and all other students between years tested ($p = .008$).

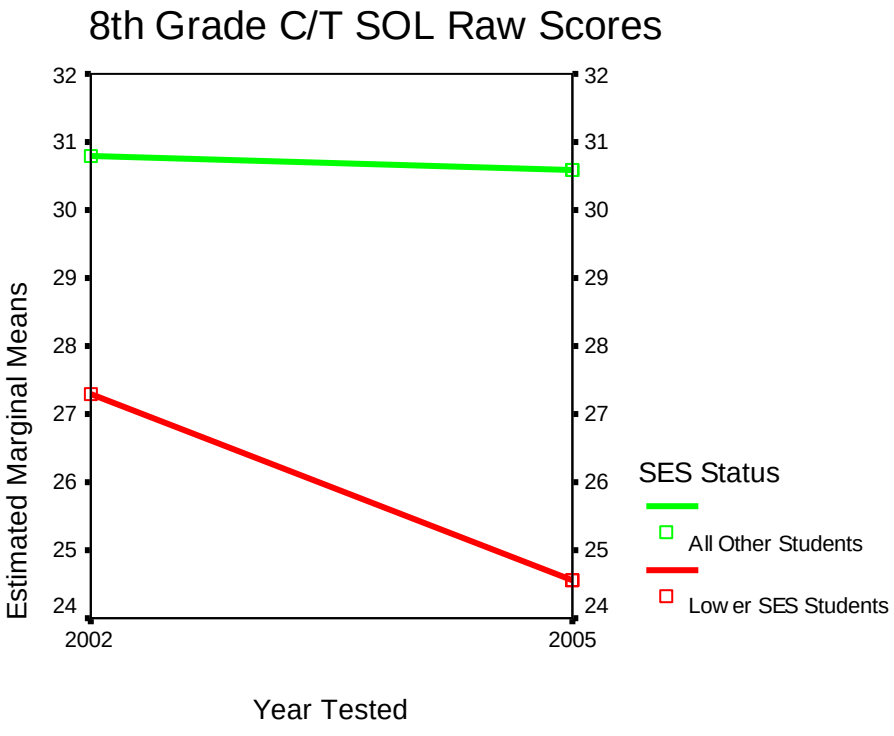
Table 135

Between Subjects Effects from Eighth Grade C/T SOL Test Raw Scores ANOVA

Source	Type III Sum of Squares	df	Mean Square	F	*p*
Corrected Model	6018.535	3	2006.178	43.889	.000
Year Tested	421.488	1	421.488	9.221	.002
SES Status	4459.085	1	4459.085	97.551	.000
Year Tested* SES Status	323.013	1	323.013	7.067	.008
Error	52978.198	1159	45.710		
Total	1070832.000	1163			
Corrected Total	58996.733	1162			

Figure 16 displays the profile plot for the estimated marginal means for the eighth grade *C/T SOL* scores.

Figure 16



Post hoc tests were run using a *t*-test for independent means comparing the lower SES student scores to all other students for grades five and eight for both testing years.

Fifth Grade Results of Raw Score Comparison of Lower SES Students to Group

As illustrated in Table 136, 286 raw scores from the 2002 fifth graders, who were identified and tagged as qualifying for free and reduced price lunches, were compared with 339 raw scores from all other 2002 fifth graders using a t-test for independent means. The group statistics show the mean for the lower SES 2002 fifth graders was 20.53 correct answers, while the mean for all other fifth graders was 23.80. The *SD* was 5.08 for the low SES students and 5.03 for all other 2002 fifth graders.

Table 136

Descriptive Statistics for 2002 Fifth Grade C/T SOL Test

	Socio-Economic Status	N	Mean	Std. Deviation	Std. Error Mean
2002 5th Grade C/T Raw Scores	Free and Reduced Lunch Students	286	20.53	5.08	.30
	All Other Students	339	23.80	5.03	.27

The data for the independent samples t-test is displayed in Table 137. Levene's Test for Equality of Variances was run to determine if the two groups shared approximately equal variance on the dependent variable. As the significance level of p =.437 was greater than α =.05, the assumption was made that the two variances were approximately equal. The calculated t value of 8.1 with 623 degrees of freedom exceeded the critical value of 1.96 needed to determine that the over three question average difference in the means of the two groups was significant (p = .000).

Table 137

Independent Samples T-test for 2002 Fifth Grade C/T SOL Test Data

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2002 5th Grade Low SES vs. All	.605	.437	-8.065	623	.000	-3.27	.41

As illustrated in Table 138, 260 raw scores from the 2005 fifth graders, who were identified and tagged as qualifying for free and reduced price lunches, were compared with 322 raw scores from all other 2005 fifth graders using a *t*-test for independent means. The group statistics show the mean for the lower SES 2005 fifth graders was 17.78 correct answers, while the mean for all other fifth graders was 22.13. The *SD* was 5.35 for the low SES students and 4.89 for all other 2005 fifth graders.

Table 138

Descriptive Statistics for 2005 Fifth Grade C/T SOL Test

	Socio-Economic Status	N	Mean	Std. Deviation	Std. Error Mean
2005 5th Grade C/T Raw Scores	Free and Reduced Lunch Students	260	17.78	5.35	.33
	All Other Students	322	22.13	4.89	.27

The data for the independent samples *t*-test is displayed in Table 139. Levene's Test for Equality of Variances was again run to determine if the two groups shared approximately equal variance on the dependent variable. As the significance level of $p = .122$ was greater than $\alpha = .05$, the assumption was made that the two variances were approximately equal. The calculated *t* value of 10.2 with 580 degrees of freedom exceeded the critical value of 1.96 needed to determine that the over four question average difference in the means of the two groups was significant ($p = .000$).

Table 139

Independent Samples T-test for 2005 Fifth Grade C/T SOL Test Data

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2005 5th Grade Low SES vs. All	2.394	.122	-10.228	580	.000	-4.35	.43

Eighth Grade Results of Raw Score Comparison of Lower SES Students to Group

As illustrated in Table 140, 102 raw scores from the 2002 eighth graders, who were identified and tagged as qualifying for free and reduced price lunches, were compared with 539 raw scores from all other 2002 eighth graders using a *t*-test for independent means. The group statistics show the mean for the lower SES 2002 eighth graders was 27.30 correct answers, while the mean for all other eighth graders was 30.78. The *SD* was 6.74 for the low SES students and 7.09 for all other 2002 eighth graders.

Table 140

Descriptive Statistics for 2002 Eighth Grade C/T SOL Test

	Socio-Economic Status	N	Mean	Std. Deviation	Std. Error Mean
2002 8th Grade C/T Raw Scores	Free and Reduced Lunch Students	102	27.30	6.74	.67
	All Other Students	539	30.78	7.09	.31

The data for the independent samples *t*-test is displayed in Table 141. Levene's Test for Equality of Variances was again run to determine if the two groups shared approximately equal variance on the dependent variable. Since the significance level of $p = .999$ was greater than $\alpha = .05$, the assumption was made that the two variances were approximately equal. The calculated *t* value of 4.6 with 639 degrees of freedom exceeded the critical value of 1.96 needed to determine that the over three and one-half question average difference in the means of the two groups was significant ($p = .000$).

Table 141

Independent Samples T-test for 2002 Eighth Grade C/T SOL Test Data

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2002 8th Grade Low SES vs. All	.000	.999	-4.578	639	.000	-3.48	.76

As illustrated in Table 142, 173 raw scores from the 2005 eighth graders, who were identified and tagged as qualifying for free and reduced price lunches, were compared with 349 raw scores from all other 2005 eighth graders using a *t*-test for independent means. The group statistics show the mean for the lower SES 2005 eighth graders was 24.56 correct answers, while the mean for all other fifth graders was 30.60. The *SD* was 6.73 for the low SES students and 6.24 for all other 2005 eighth graders.

Table 142

Descriptive Statistics for 2005 Eighth Grade C/T SOL Test

	Socio-Economic Status	N	Mean	Std. Deviation	Std. Error Mean
2005 8th Grade C/T Raw Scores	Free and Reduced Lunch Students	173	24.56	6.73	.51
	All Other Students	349	30.60	6.24	.33

The data for the independent samples *t*-test is displayed in Table 143. Levene's Test for Equality of Variances was again run to determine if the two groups shared approximately equal variance on the dependent variable. As the significance level of p =.159 was greater than α =.05, the assumption was made that the two variances were approximately equal. The calculated *t* value of 10.1 with 520 degrees of freedom exceeded the critical value of 1.96 needed to determine that the over six question average difference in the means of the two groups was significant (p = .000).

Table 143

Independent Samples T-test for 2005 Eighth Grade C/T SOL Test Data

	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
2005 8th Grade Low SES vs. All	1.991	.159	-10.133	520	.000	-6.04	.60

Results of Scaled Score Comparison of 2005 Eighth to 2002 Fifth Grade Cohort Group

According to Fraenkel & Wallen (2000) repeated measures ANOVA is used when all members of a population are measured under a number of different conditions. Repeated measures ANOVA was selected for this portion of the study because it is used to compare the mean scores of the same group who have been tested more than once and following a treatment. In this case, a cohort group was tested in 2002 as fifth graders using the appropriate grade level version of the *C/T SOL* test and once again as eighth graders in 2002 using the eighth grade version of the 2002 *C/T SOL* test.

A total of 397 students were identified as having taken the *C/T SOL* test in 2002 as fifth graders and who were also tested in this study as eighth graders in the 2005 administration. The students' raw scores from the 2002 fifth grade test administration were converted to scale scores using the electronic file provided to the school division by Harcourt-Brace. The raw scores from the 2005 eighth grade test administration for the same students were also converted to scale scores using a table from the *2001 – 2002 Virginia SOL Assessment Technical Report* published by the Virginia Department of Education (VDOE) (2003). The means of the two sets of scaled scores were compared using *SPSS* software and a repeated measures ANOVA.

For the purpose of comparison between lower SES students and all other students, any fifth grader who was coded as qualifying for free and reduced price lunch was also coded the same as an eighth grader.

As illustrated in Table 144, the group statistics show the mean of the scaled scores for the students as fifth graders was 463.68, while the mean score as eighth graders was 435.46. The standard deviation (*SD*) was 58.18 for the fifth grade scores and 67.69 for the eighth grade scores.

Table 144

Descriptive Statistics for Cohort Group Computer/Technology SOL Scaled Scores

Year Tested	Socio-Economic Status	Mean	Std. Deviation	N
2002 5th Grade Scaled	Lower SES Students	434.78	44.88	158
	All Other Students	482.78	58.17	239
	Total	463.68	58.18	397
2005 8th Grade Scaled	Lower SES Students	407.97	59.32	158
	All Other Students	453.64	66.84	239
	Total	435.46	67.69	397

As shown in Table 145, the difference in the means of the two sets of scaled scores was significant (p = .000) between years tested. The change in the gap in scaled scores between lower SES students and all other students over years tested was not significant (p = .694).

Table 145

Within Subjects Effects from Cohort Group C/T SOL Scaled Scores Repeated Measures ANOVA

Source		Type III Sum of Squares	df	Mean Square	F	*p*
Year Tested	Sphericity Assumed	148925.804	1	148925.804	89.437	.000
Year Tested* SES Status	Sphericity Assumed	257.265	1	257.265	.154	.694
Error	Sphericity Assumed	657733.420	395	1665.148		

As shown in Table 146, the difference in the means of the two sets of scaled scores was significant (p = .000) between lower SES students and all other students in the cohort group.

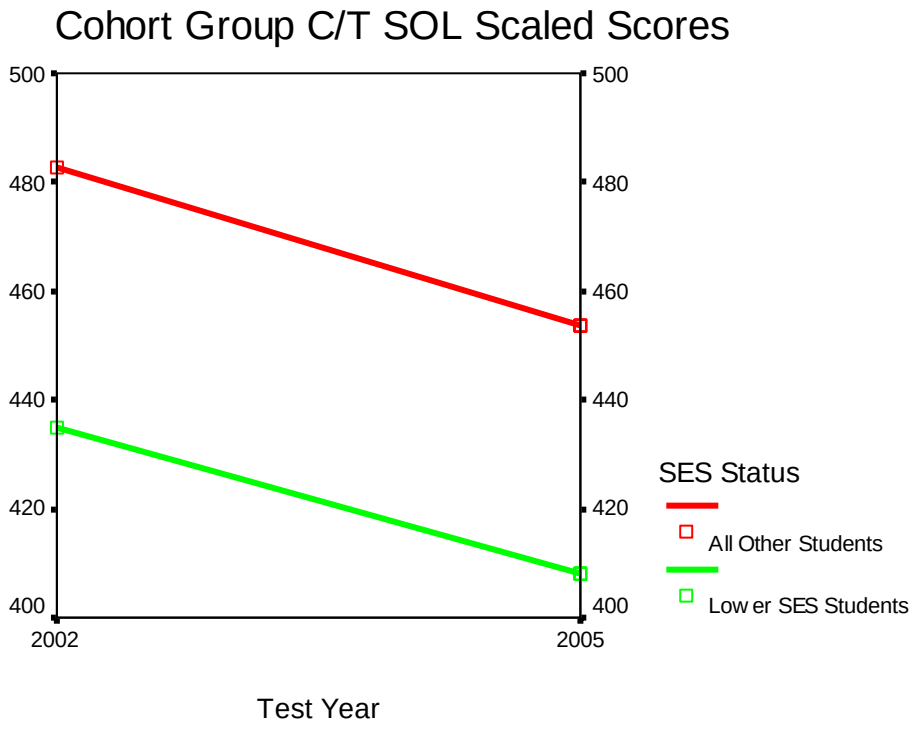
Table 146

Between Subjects Effects from Cohort Group C/T SOL Scaled Scores Repeated Measures ANOVA

Source	Type III Sum of Squares	df	Mean Square	F	*p*
SES Status	417208.008	1	417208.008	79.243	.000
Error	2079646.683	395	5264.928		

Figure 17 displays the profile plot for the estimated marginal means for the cohort group *C/T SOL* scores.

Figure 17



CHAPTER 5: SUMMARY AND DISCUSSION

With the No Child Left Behind Act's (NCLB's) increased emphasis on the subjects of math, science, and English/reading, some educators voiced concerns about the de-emphasis of instruction in other areas like art, music, physical education, and computer/technology (Chapman, 2005). In the case of computer/technology in Virginia, this fear of a de-emphasis of the content was ostensibly justified as the *Standards of Learning* assessments for computer/technology were discontinued from the state testing program in 2002.

While teachers are expected to continue to provide instruction in the content of the computer/technology standards, high stakes testing may have the unintended consequence of pressuring teachers to make decisions that narrow the curriculum in this and other non-tested areas. The effect of increased pressure from NCLB for students to perform well on "core" *Standards of Learning (SOL)* exams in Virginia, coupled with the removal of the state assessments in computer/technology, provided a case to examine evidence of a possible de-emphasis on one such "non-core" subject.

Further, because this study was based on knowledge of technology, the research in the field suggested another topic of interest – the "digital divide." The term "digital divide" refers to the perceived knowledge gap between those who have access to the latest technologies and those who do not. Underlying this concept is the notion that since we are now in the midst of the Information Age, those not having access to information through the latest technologies are considered to be disadvantaged (National Postsecondary Education Cooperative (NPEC), 2004). There is ample evidence that a digital divide still exists for students from families with lower socio-economic status (SES), and the majority of these lower SES students rely on schools for both computer technology and Internet access (Eamon, 2004; NPEC, 2004; Patrick, 2004).

The effect of increased pressure from NCLB for students to perform well on the "core content" *SOL* exams in Virginia, coupled with the removal of the state assessments in computer/technology, provided a case to examine evidence of a possible de-emphasis on "non-core" subjects. If a tendency to narrow the curriculum exists, it might result in a lesser quantity and quality of instruction and, therefore, less student achievement in the computer/technology content area. Further, if there is lesser quality and quantity of instruction in computer/technology content, it might result in even less student achievement for those on the downside of the digital divide, lower SES students, as compared to their peers. The data collected through the state-wide administration of the Virginia fifth and eighth grade *C/T SOL* assessments over several years provided an opportunity to investigate these questions.

This study was conducted in two phases. Phase I employed the use of a survey to determine teacher perceptions of the effects of high stakes testing on teaching and learning. The survey was administered to a population of all elementary and middle school classroom teachers in a midsize urban Virginia school division which yielded 275 usable forms. The survey had sixteen questions with a combination of Likert-type and yes/no responses followed by open-ended prompts designed to elicit written data that would provide further insight into the teachers' perceptions.

An aspect of the analysis of survey data involved cross tabulations, which indicated the number of participants who belonged to one or more of three groups or categories. The three classification criteria examined were: 1) teachers who were at the elementary level or the middle school level; 2) teachers who had experience teaching prior to the implementation of *SOL* testing in 1998 and those who did not, and; 3) teachers who indicated on the survey they perceived they were teaching either high, middle, or low percentages of lower SES status students.

Phase II of this study involved the administration of the 2002 fifth and eighth grade versions of the *Virginia C/T SOL* assessment to a population of all fifth and eighth grade students in 2005 within the same midsize urban Virginia school division. The purpose of the second phase of this research was to provide data to be used in conjunction with teachers' perceptions of whether or not state standards and accountability measures impact their instructional decisions and the curriculum. More specifically, these data would be used in comparison with survey items asking whether teachers felt the *C/T SOL* had or had not been de-emphasized. Using a univariate ANOVA, comparisons of the means of raw scores from 2002 fifth (n = 625) and eighth (n = 641) and 2005 fifth (n = 583) and eighth (n = 522) grades were conducted. Comparisons were also conducted between and within groups with raw scores from students who qualified for free and reduced price lunches and were considered low SES. In addition, using a repeated measures ANOVA, comparisons were made between the scaled scores of 397 students who were eighth graders in 2005 and their scaled scores as fifth graders when they were tested in 2002 to determine what, if any, changes in achievement might have occurred within this cohort group. Finally, within the cohort group, 197 of these 397 students were identified and tagged as qualifying for free and reduced price lunches as fifth graders in 2002. These students' scores were compared with their non-economically disadvantaged peers' scores to determine what changes might have occurred within this cohort group.

Summary and Discussion of the Results

Teachers' Perceptions of the Effects of High Stakes Testing on Classroom Instruction

Over eighty percent of the teachers surveyed believed that instruction has changed due to the implementation of *SOL* testing, with a majority of those believing the greatest impact was in the areas of instructional focus and instructional time. These findings are consistent with those from similar studies such as McMillan et al. (1999) and Pedulla (2003). These frequencies and percentages were constant across the independent variables of teaching level, *SOL* experience, and perceived levels of lower SES students taught.

Teachers seem to perceive that the focus of instruction has become increasingly centered on the core content *SOL*, often to the exclusion of other non-tested subjects. Over fifty-two percent of respondents indicated that "The focus of instruction has become student performance on the *SOL*," and complained that they were "teaching to the test." Teachers seem to believe this increased focus on *SOL* content has impacted instruction in particular through the omission of certain activities that may be interesting or beneficial to students. Over sixty percent of teachers across all independent variables felt the constraints of *SOL* testing have impacted classroom instruction by forcing them to omit information or eliminate activities. As one teacher lamented,

"You can't go into depth and do true meaningful activities because there is so much emphasis on testing."

In addition, over one-third of these teachers were concerned that this increased focus on the core content areas has restricted or eliminated altogether any instructional time for lessons or activities that are not necessarily tested by the *SOL* assessment program. Another fourth were also concerned about their perceived inability to find time to cover all the required material, let alone anything outside the realm of the tested content. These findings appear to be similar to those in other studies conducted in other states and Virginia (Stecher & Hamilton, 2002; Jones et al., 1999; Koretz et al., 1996a).

There were significant differences in the perceptions of elementary and middle school teachers regarding whether or not instruction in areas that are not *SOL* tested has changed. Over seventy percent of elementary teachers felt instruction in these areas had changed while over half the middle school teachers indicated they felt it had not changed. Perhaps this is due to the fact that elementary school teachers are often required to teach numerous subjects throughout the day and would have better insight as to what is impacted, while middle school teachers are usually single-subject teachers. As one elementary teacher commented, "Most teachers probably don't engage in many areas which aren't covered by the *SOL* test."

There were also significant differences in the perceptions of the teachers with perceived high numbers of lower SES students and those with perceived low numbers of lower SES students. Over seventy percent of the teachers with perceived high levels of low SES students (high level teachers) felt instruction in areas not *SOL* tested had changed while only half the perceived low levels of lower SES teachers (low level teachers) did. Perhaps there are more instructional challenges facing the high level SES teachers than those with lower numbers. As one high level SES teacher commented, "The teachers are given guides with skills listed that must be taught during a given period of time which ensures all skills are covered during the year. This is a good point. On the other hand, the fun has gone out of it! The *SOL*s don't allow for 'the fun teachable, spontaneous moments' that we used to have which allowed more fun memorable activities the kids enjoyed."

Overall, fifty-two percent of teachers perceived that this increased focus on the *SOL* and decreased instructional time for other non-tested areas has reduced student access to non-core content like art, music, physical education and computer/technology. Most often, these respondents cited the "… need for more time in the classroom to teach the *SOL* tested material" and similar comments as the reason for lesser access. These findings were similar to those of Taylor et al. (2001) which found in some cases the increased attention toward content that is tested has led to a decreased emphasis on curricular areas that are not measured under the assessment program.

According to the respondents, a final impact of *SOL* testing on classroom instruction is a narrowing of the curriculum. When asked if they feel the curriculum they teach has been narrowed due to *SOL* testing, three fourths of teachers agreed with the statement, and over half of the teachers indicated that they "strongly agreed." These findings are similar to those from other studies. For example, Hoffman et al., (2001) surveyed teachers about the impact of the Texas

Assessment of Academic Skills (TAAS). In their findings, they reported that there is "considerable curriculum displacement due to TAAS because 85% of the teachers replied that 'if it's not being tested, it's not being taught'," (p. 489).

Teachers' perceptions of feeling pressure to improve SOL test scores

More than nine out of every ten teachers in this study agreed with the statement that testing creates pressure on teachers for students to perform well, with greater than seven of every ten indicating they "strongly agree." Sources of the pressure appear to be coming from their school's principal, followed by administrators from the central office and then the superintendent and school board.

The types of pressures teachers perceived they felt were tied most often to having their school accredited, which may indicate sanctions from the state and the federal No Child Left Behind legislation do have an impact on teachers in the classroom. There was a significant difference in the perceptions of elementary and middle school teachers regarding pressure in this area as nearly eighty-three percent of elementary teachers felt this pressure while only seventy percent of the middle school teachers felt the same.

Pressure to have all students in their class pass the *SOL* test was the next most frequent response, followed by pressure to cover the entire required curriculum. This appears to confirm other data in the survey as teachers indicated they felt classroom instruction had changed due to constraints placed on them by the amount of *SOL* tested content and the tight timelines associated with the delivery of that content. Other state studies provide supportive data for these findings. For example, Moon et al., (2003, p. 55) in a survey of California, Texas, and Virginia teachers, concluded that "content delivered to students also seems to be directly affected by the state testing pressure."

These findings also seem consistent with a national survey (Pedulla, 2003) where items related to pressure on teachers dealt with pressure from administrators and parents to improve test scores, and pressure to limit teaching to what is tested and to change teaching methods in ways that are not always beneficial.

There were some significant differences again between the middle and elementary teachers in this area as over eighty percent of the elementary teachers felt pressure to have their students pass, while just sixty-five percent of the middle school teachers felt the same way. Similarly, seventy-five percent of the elementary teachers felt pressure to cover the required curriculum while only fifty-five percent of the middle school teachers felt the same pressure. This again may be attributable to the fact that most elementary teachers have a group of students all day and teach a variety of subjects, while most middle school teachers teach five classes of a single subject.

Teachers' perceptions of the impact of SOL testing on students' knowledge of the Computer/Technology SOL

When asked if the *C/T SOL* were still being taught, there were significant differences in the responses of the middle and elementary teachers. Middle school teachers felt that the standards were being taught despite not being assessed, while just over half of elementary teachers felt they were not. Elementary teachers also felt that removing the *C/T SOL* tests has resulted in less of that content being taught, while the majority of middle school teachers believed it had not resulted in less computer/technology content being taught. However, a majority in both groups felt that removing the *C/T SOL* test has not resulted in students knowing less of the content. Both groups also felt that their students demonstrate adequate computer/technology skills.

Another significant difference in perceptions in this area appears to be among teachers who believe they are teaching high levels of lower SES students and those who believe they have low levels of lower SES students in their classes. A majority of teachers with high levels of lower SES students did not believe that the *C/T SOL* were still being taught. They did believe that teaching less of this content has resulted in students knowing less. A majority of teachers with low levels of lower SES students believed that the *C/T SOL* were still being taught and they did not think that teaching less of that content has resulted in students knowing less.

The teachers who perceive they are teaching high levels of lower SES students are in contact with these students everyday. It is conceivable that these same teachers, in contrast to teachers teaching low levels of lower SES students, are in a better position to gauge the negative effects that any reduction of instruction in technology would have on these digital divide students.

Of the teachers who felt the *C/T SOL* were still being taught despite the removal of the associated *SOL* tests, the most common reason cited for this belief was the continued focus on the use of technology in instruction and the "… push to integrate technology into our curriculum."

Those respondents who did not feel the *C/T SOL* were being taught most often cited the issue of time constraints placed on teachers due to those *SOL* that are still being assessed by the state. In addition, the teachers also mentioned the focus of instruction and "…the concentration on teaching what is tested" as reasons why the *C/T SOL* are not being taught.

Teachers were asked how the 2005 fifth or eighth grade students' raw scores would compare with those of the 2002 fifth and eighth grade students if the 2005 students were tested using the 2002 *C/T SOL* tests under similar conditions. Overall, the most frequent response had just under one-third of the teachers believing that the 2005 students would score about the same as those students who took the test in 2002. The next largest percentage believed the 2005 students would do worse on the test than the 2002 group. The least frequent response was from those teachers who believed the 2005 students would perform better on the *C/T SOL* test.

When these responses were cross tabulated by the independent variables, differences in perceptions were once again apparent among elementary and middle school teachers. The majority of elementary teachers felt the 2005 students would perform worse than those of 2002, while middle school teachers were much more optimistic with the majority believing the 2005

students would score the same as or better than those of 2002. Similarly, differences were apparent among teachers with perceived high levels of lower SES students and low level SES teachers. The majority of teachers with high levels of lower SES students felt the 2005 students would perform worse than those of 2002, while the majority of teachers with low levels of lower SES felt they would perform about the same or better.

Of those teachers who felt the 2005 students would perform worse, the majority cited the focus of instruction being on those areas that continue to be tested by the *SOL* assessment program and the time constraints created by the content and curriculum requirements of that testing. This, again, is consistent with earlier data provided by the respondents.

Of those who believed students would perform the same or better in 2005, most cited the influx and perceived daily use of computers and other technology in schools and at home. Teachers with perceived low levels of lower SES students appeared to believe that the majority of students have access to technology both in and out of school.

Findings from the C/T SOL test results regarding all students

Following the administration of the 2002 versions of the *C/T SOL* assessment to a population of all 2005 fifth and eighth grade students in the same medium-size urban Virginia school district, the test results were analyzed using the *Statistical Package for Social Sciences (SPSS)* software version 10.

The fifth grade version of the 2002 *C/T SOL* exam had a total of 30 multiple choice questions. Six-hundred and twenty five raw scores from the 2002 fifth graders were compared with 583 raw scores from the 2005 fifth graders using a univariate ANOVA. The difference in the means of the two groups was significant across test years for all students ($p = .000$).

The eighth grade version of the 2002 *C/T SOL* exam had a total of 40 multiple choice questions. Six-hundred and forty-one raw scores from the 2002 eighth graders were compared with 522 raw scores from the 2005 eighth graders using a univariate ANOVA. The difference in the means of the two groups was significant across years for all students ($p = .000$).

Teacher Perceptions of 2002 Fifth Grade – 2005 Eighth Grade Cohort Performance

Respondents were asked if the scaled scores of a cohort group of students who took the *C/T SOL* test as eighth graders in 2005 would be better, worse, or about the same as their scaled scores from the fifth grade test they took in 2002.

Overall, nearly thirty-three percent of teachers surveyed believed that the 2005 eighth grade students would score about the same on the *C/T SOL* test as they did when they took the corresponding *C/T SOL* test for fifth graders in 2002. Twenty-four percent believed the students would perform better, and less than fourteen percent of the teachers thought they would do worse.

When the responses were cross tabulated by the teaching level of the respondents, the difference in the two groups' perceptions were significant. At the middle school level, forty-six percent of

the teachers felt that the students would score better on the *C/T SOL* test for eighth graders in 2005 than they did on the assessment for fifth graders in 2002. A slight majority of elementary teachers felt they would do about the same.

Comparisons of responses between teachers with perceived high and low levels of lower socio-economic status students in their classrooms showed that over seventy-two percent of the teachers with high levels of lower SES students felt that the 2005 students would perform about the same or worse as eighth graders on the *C/T SOL* test than they did in 2002 on the fifth grade exam. Nearly forty-three percent of teachers with perceived low levels of lower SES students felt they would do better as eighth graders.

Of those teachers indicating they felt the 2005 eighth grade students would score about the same or better than they did as fifth graders in 2002 on the *C/T SOL* tests, most cited greater access to and availability of technology as the reason, and the perception that "they use technology daily either at home or at school."

Of the teachers who indicated they felt the 2005 eighth grade students would not perform as well on the *C/T SOL* test, most believed it was due to the perception that the technology standards are "…no longer taught." Other respondents felt the 2005 eighth grade students would do worse as a result of the perception that "less time has been spent focusing on computer technology due to emphasis on core *SOL,*" and that there is "no time for specific instruction as in past years."

Findings from the C/T SOL test results regarding 2002-05 cohort group

Three hundred and ninety-seven students were identified as having taken the *C/T SOL* test in 2002 as fifth graders and also as having participated as eighth graders in the 2005 administration. The fifth grade version of the 2002 *Computer/Technology SOL* exam had a total of 30 multiple choice questions. Since the eighth grade version of the *C/T SOL* test contained a total of 40 multiple choice items, and in order to equate for test difficulty, the 397 student raw scores from the 2002 fifth grade test administration were converted to scale scores using an electronic file provided to the school division by Harcourt-Brace. The raw scores from the 2005 test administration for the same 397 students were also converted to scale scores using a table from the *2001 – 2002 Virginia SOL Assessment Technical Report* published by the Virginia Department of Education (VDOE) (2003). The means of the two sets of scaled scores were compared using a repeated measures ANOVA. The difference in the means was significant across testing years ($p = .000$).

These findings clearly indicate that overall the 2002 fifth and eighth grade students answered more questions correctly than did the fifth and eighth graders of 2005 on the *C/T SOL* assessment tests. The findings also appear to indicate that the students who took the fifth grade test in 2002 did not do as well overall on the eighth grade technology test in 2005.

Teachers' perceptions of the impact of socio-economic status of students on their knowledge of Computer/Technology SOL content

A disappointing number of teachers chose not to respond to the two survey questions which asked for perceptions of the level of computer/technology knowledge of lower SES students in 2002 and 2005. As mentioned earlier, this might have been due to survey fatigue since the two questions were near the end of the survey. It is also possible that respondents felt uncomfortable predicting how lower SES students would perform without projecting a stereotypical image since at least one teacher commented, "How can you predict that? There are too many unknown factors that can influence the results. If I made a prediction, I would be stereo-typing and pre-judging our free and reduced lunch students." Another commented, "What does free/reduced lunch have to do with learning? Students who are encouraged, supported, etc. will achieve expectations you set for them." A third teacher had the opinion, "I don't think the 'free and reduced lunch' qualifications would really affect how they do on the test. They still receive the same instruction at school."

Of those that did respond, thirty-seven percent of teachers believed the 2005 lower SES students would perform about the same as their peers on the *C/T SOL* assessment, with a nearly equal percentage believing they would perform worse than their classmates. Few teachers believed that these students would perform better than their peers.

Comparisons of responses between elementary and middle school teachers indicated that over half of the middle school teachers felt that the 2005 free and reduced price lunch students would perform worse on the *C/T SOL* test than their grade level peers. The greatest percentage of elementary school teachers believed that the lower SES group would perform about the same as their classmates.

Comparisons of responses between teachers with perceived high and low levels of lower SES students in their classrooms showed that a greater percentage of the teachers with high levels of lower SES students felt that these same students would not perform as well as their peers on the *C/T SOL* test. The greater percentage of teachers with low levels of lower SES students felt these students would perform about the same as their peers.

Teachers who believed there would be no digital divide and that lower SES students would perform about the same as their peers cited greater exposure and access to technology as the reason. Oddly enough, the reason most often cited by those who believed the lower SES students would perform worse than their fellow students was the *lack of access* to technology - particularly in the home. It is worth noting that a group of teachers also mentioned the lack of time for technology and the focus on core *SOL* as the reason these students would not perform as well as their peers.

Findings from the C/T SOL test results comparing lower SES students with all others

Since a portion of this study was concerned with the ramifications of the digital divide, for purposes of comparison and to determine if evidence of a greater divide in knowledge of computer/technology exists, data was also analyzed using scores from the 2002 administration of the *C/T SOL* test.

The means of 286 lower SES students and 339 other students from the 2002 fifth grade group were compared with 260 lower SES students and 322 other students from the 2005 fifth grade using a univariate ANOVA. The difference in the means was significant between the lower SES students and all other students in both testing years ($p = .000$).

The means of 102 lower SES students and 539 other students from the 2002 eighth grade group were compared with 173 lower SES students and 349 other students from the 2005 eighth grade group using a univariate ANOVA. The difference in the means was significant between the lower SES students and all other students in both testing years ($p = .000$) and in this case between testing years ($p = .008$)

Post hoc *t*-tests for independent means were run using the raw scores from the 2002 and 2005 fifth grade administration of the *C/T SOL* test. The group statistics show the mean for the lower SES 2002 fifth graders was 20.53 correct answers, while the mean for all other fifth graders was 23.80. The 3.27 difference in the means of the two groups was statistically significant ($\alpha = .05$). The group statistics show the mean for the lower SES 2005 fifth graders was 17.78 correct answers, while the mean for all other fifth graders was 22.13. The 4.35 difference in the means of the two groups was statistically significant ($\alpha = .05$).

Post hoc *t*-tests for independent means were also run using the raw scores from the 2002 and 2005 eighth grade administration of the *C/T SOL* test. The group statistics show the mean for the lower SES 2002 eighth graders was 27.30 correct answers, while the mean for all other eighth graders was 30.78. The 3.48 difference in the means of the two groups was also statistically significant ($\alpha = .05$). The group statistics show the mean for the lower SES 2005 eighth graders was 24.56 correct answers, while the mean for all other eighth graders was 30.60. The 6.04 difference in the means of the two groups was also statistically significant ($\alpha = .05$).

The findings from the *C/T SOL* test data seem to indicate that in 2002 lower SES students in fifth grade answered an average 3.27 fewer questions correctly than their grade level peers. The 2002 eighth grade lower SES answered 3.43 fewer questions correctly compared to their classmates. This result would seem predictable based on the research concerning the digital divide and its relationship to economic status which is often tied to access and equity issues with computer/technology (Eamon, 2004; NPEC, 2004; Patrick, 2004). However, the ANOVA results also seem to indicate that for some the divide may be widening as the 2005 eighth grade lower SES students had an average difference of 6.04 fewer correct answers than their peers leading to a significant difference in the digital divide between years on the eighth grade scores.

Teacher Perceptions of 2002 Fifth Grade – 2005 Eighth Grade Low SES Cohort Performance

Respondents were asked if the scores of a cohort group of lower SES students who took the *C/T SOL* test as eighth graders in 2005 would be better, worse, or about the same as their scores from the fifth grade test they took in 2002.

Overall nearly a third of the teachers surveyed believed that the 2005 eighth grade students who qualified for free and reduced price lunch would score about the same on the eighth grade *C/T SOL* test as they did as on the associated test as fifth graders in 2002. Over one-fifth of the respondents believed the 2005 eighth grade lower SES students would score worse on the test. A large percentage of teachers chose not to respond to this question which, as in the previous question, could be due to survey fatigue or because they simply did not feel qualified to predict the result.

Comparisons of responses between elementary and middle school teachers indicate that over thirty-seven percent of the elementary school teachers felt that the 2005 eighth grade free and reduced price lunch students would score worse on the eighth grade *C/T SOL* test than they did on the fifth grade exam. Middle school teachers were more optimistic, with over a third of the teachers believing the lower SES eighth grade students would perform better than they did as fifth graders.

Over forty-two percent of teachers with perceived high levels of lower socio-economic status students in their classrooms indicated they felt that these same 2005 eighth grade students would perform worse on the eighth grade *C/T SOL* test than they did on the fifth grade test. Nearly twenty-nine percent of teachers with low levels of lower SES students believed the 2005 eighth graders would perform better than they did as fifth graders.

Of those teachers indicating they felt the 2005 eighth grade students who qualify for free and reduced price lunch would score about the same as or better than they did as fifth graders on the *C/T SOL* test, most believed it was due to greater access to and the availability of technology and "students have a great amount of exposure to computers now."

Once again, the respondents who indicated they felt that the lower SES students would not perform as well as eighth graders as they did in fifth grade, believed it was due to the *lack of access* to and availability of technology since "without access at home and less instruction at school they would not be able to maintain and further their skills."

Findings from the C/T SOL test results regarding 2002-05 lower SES students in cohort group

One hundred and fifty-eight students were identified as having taken the *C/T SOL* test in 2002 and as qualifying for free and reduced price lunch as fifth graders. These 158 low SES students were also tested in this study as eighth graders in the 2005 administration. The means of the two sets of scaled scores were compared using a repeated measures ANOVA. The group statistics showed the mean of the scaled scores for the low SES students as fifth graders was 434.78, while their mean score as eighth graders was 407.97. The mean difference between the two sets of scaled scores was statistically significant ($p = .000$). These findings appear to indicate that

overall the lower SES students who took the fifth grade *C/T SOL* test in 2002 did not perform as well on the eighth grade technology test in 2005.

Conclusions

- Teachers feel testing has changed the focus of instruction toward areas that are tested and away from content that is not
- Teachers feel testing has also increased the amount of time spent on *SOL* tested content and lessened instructional time in areas that are not
- Teachers feel testing creates pressure and a consequence of that pressure is a narrowing of the curriculum
- Testing data showed that overall the 2002 students performed better on the *C/T SOL* test than did the 2005 students
- Overall the 2002 and 2005 lower SES students did not perform as well as their peers who did not qualify for free and reduced price lunch
- There was a significant difference in the mean scores of 8th grade lower SES students and their non-low SES peers both within and across testing years – perhaps widening the digital divide

On the basis of this study alone, it is difficult to be certain about the factors that may be contributing to the significant difference in the *C/T SOL* test scores between those students who tested in 2002 and those who were tested in 2005. As noted earlier, a majority of teachers attribute the implementation of high stakes *SOL* testing to a change in the focus of instruction to areas that are tested and away from those that are not. In addition, they indicated concerns about the amount of time being spent on covering required material at the expense of certain activities and non-tested content such as computer/technology. These findings are supported by other studies that suggest what does not get tested may get less attention or may not get taught at all (McMillan et al., 1999; Taylor, et al., 2001; Stecher & Hamilton, 2002; Sunderman et al., 2004).

Perhaps exacerbating the perceived narrowing of the curriculum to tested content is the amount of pressure teachers believe they are under for their students to perform well on the *SOL* tests. A vast majority of the respondents in this study agreed or strongly agreed with the statement that testing creates pressure for teachers and students to perform well. This coincides with similar findings in Maryland, where 88% of teachers surveyed felt they were under "undue pressure" to improve student performance on the state test (Koretz et al., 1996b). An even larger proportion of Kentucky teachers (98%) responded similarly when asked the same question (Koretz et al., 1996a).

Until the last administration in spring 2002, the *C/T SOL* test was used for school accreditation purposes and was therefore included in the main stream curriculum. The assessment portion was subsequently removed in fall 2002 to make way for the core content *SOL* in response to NCLB measures, but with a requirement that the *C/T SOL* remain in place. If the teacher perceptions

are in fact real and they do feel pressure to "teach to the tests" of the *SOL* tested core content to the point of de-emphasizing other subjects like computer/technology, it is conceivable that this is reflected in the significant difference in the raw scores of students who completed the *C/T SOL* test in 2002 and those who were tested in 2005 for the purpose of this study.

What is more of a concern to this researcher is the impact this may be having on the "digital divide." There is some evidence in the data from this study that lower SES students may be losing ground in their knowledge of computer/technology at a greater rate than their non-economically disadvantaged peers. For example, the difference in the means from the 2002 administration and the 2005 study showed that the gap between students who were identified as lower SES eighth graders and those who did not qualify for free and reduced price lunches widened from 3.48 correct questions out of a possible forty in 2002 to an alarming 6.04 correct questions in 2005. If the research in this area holds true, and there is a de-emphasis in computer/technology instruction in school, then these students will continue to fall further behind since there are typically few outside resources for them to rely on for this information.

Perhaps this and future studies will help local and state education leaders recognize the potential unintended consequences of high stakes testing on teachers' decision-making as they make policy decisions regarding curriculum and instruction, and, therefore, student knowledge of tested and non-tested content standards.

Limitations of the Study and Suggestions for Future Research

Although this study used a population sample of elementary and middle school teachers and the researcher provided evidence to support the reliability and validity of the survey instrument employed, it was limited by its population of teachers who were members of a single mid-sized urban Virginia school division.

It was also partly a descriptive study intended to contribute to the research on the impacts of high-stakes testing and accountability by describing teachers' perspectives. It was not intended to test hypotheses concerning teachers' views; however, this might be a suitable approach for future research.

There is a need for more empirical research concerning teachers' views on the impacts of high stakes testing on teachers' decision making regarding what to teach, how to teach it, and what impact these decisions might have on student achievement. Presently there is a small body of research that specifically addresses teachers' perspectives, but almost no research that offers actual data to support or dispel any tentative conclusions drawn from the teachers' perceptions.

Future survey research might utilize a larger sample of teachers and students from a broader population of Virginia teachers and students than the sample from a single school division used in the present study.

Future researchers may want to consider surveying a sample of teachers at two different periods of time over the course of a school year as this might help to better understand the consistencies

or changes in teachers' views on the impacts of *SOL* testing as the test administration window draws closer.

If a narrowing of the curriculum does exist due to an increased focus on *SOL* tested areas, further research may look at ways to measure the impact this may have in non-core subjects other than computer/technology such as art, music, or physical education.

Finally, it may be useful to conduct similar *C/T SOL* testing research, with or without the teacher survey, across the state of Virginia to determine if a digital divide does exist outside the sample used in this study, and, more importantly, if the divide is widening.

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Appendix A: Teacher Survey

Lynchburg City Schools' Teacher Questionnaire
Computer/Technology *Standards of Learning* Study

This questionnaire is part of a study designed to examine the effects of *Standards of Learning* (*SOL*) testing on teaching practices. The survey will take approximately ten minutes to complete. All survey respondents and the data collected will remain anonymous. Thank you for your assistance with this study.

1. Grade(s) you currently teach: (circle all that apply) K 1 2 3 4 5 6 7 8

2. Number of years you have been teaching including this year: _____

3. Please estimate the percentage of students you teach who are eligible for free or reduced lunch. _____ %

4. Do you think classroom instruction in content areas that are *SOL* tested has changed since the implementation of *SOL* testing? Yes _____ No _____ If yes, how has it changed? _____
_____
_____

5. Do you think classroom instruction in areas not covered by *SOL* testing has changed since the implementation of *SOL* testing? Yes _____ No _____ If yes, how has it changed?_____
_____
_____

6. Do you ever omit certain information because there is not enough time to fit it in due to the content requirements of the *SOL* test? Yes _____ No _____ If yes, please provide an example. _____
_____
_____

7. Do you ever omit certain activities that may be interesting or beneficial to students due to the content requirements of the *SOL* test? Yes _____ No _____ If yes, please provide an example. _____
_____
_____

8. Do you think student access to electives like art, music, and physical education has increased _____, decreased_____, or remained the same _____ due to *SOL* testing? Why do you think so? _____
_____
_____

9. To what extent do you feel pressure from the following groups to improve your students' *Standards of Learning* (*SOL*) test scores?

	no pressure		moderate pressure		great pressure
a. school board	1	2	3	4	5
b. superintendent	1	2	3	4	5
c. central office administrators	1	2	3	4	5
d. my principal	1	2	3	4	5
e. other teachers	1	2	3	4	5
f. parents	1	2	3	4	5
g. community members	1	2	3	4	5
h. the media	1	2	3	4	5
i. other _____	1	2	3	4	5

10. If you feel pressure to improve test scores, what are examples of the pressure(s) you feel? (Check any or all that apply.)
    _____ I don't feel any pressure
    _____ Pressure to cover all the required curriculum
    _____ Pressure to have all students in my class pass the SOL test
    _____ Pressure to have my school accredited
    _____ Pressure to perform well enough to avoid a negative evaluation
    _____ Pressure to meet the needs of special education students who are required to take the SOL test
    _____ Other _____

11. Do you believe the Computer/Technology *Standards of Learning* are still being taught in your school despite the fact they are no longer assessed by the state? Yes _____ No _____ Why do you think so? _____
    _____
    _____

12. If the 2004 – 2005 fifth or eighth grade students in your school were tested using the Virginia Computer/Technology *SOL* exam would they perform better, worse, or about the same as the fifth or eighth grade students who took the exam in 2002? Better _____ Worse _____ About the same _____ Why do you think so? _____
    _____
    _____

13. Do you believe the 2004 – 2005 eighth grade students' scores on the Computer/Technology *SOL* test would be better, worse, or about the same as they were when they took the test as fifth graders in 2002? Better _____ Worse _____ About the same _____ Why do you think so? _____
    _____
    _____

14. If the 2004 – 2005 fifth and eighth grade students were tested using the Virginia Computer/Technology *SOL* exam, would students who qualify for free and reduced lunch score better, worse, or about the same as their grade-level peers? Better _____ Worse _____ About the same _____ Why do you think so? _____
    _____
    _____

15. If the 2004 – 2005 eighth grade students were tested using the Virginia Computer/Technology *SOL* exam, would students who qualify for free and reduced lunch score better, worse, or about the same as when they took the test as fifth graders in 2002? Better _____ Worse _____ About the same _____ Why do you think so? _____
    _____
    _____

16. Please indicate your degree of agreement with each of the following items.

	strongly disagree			strongly agree
a. testing creates pressure on teachers for students to perform well	1	2	3	4
b. the curriculum I teach has been narrowed due to *SOL* testing	1	2	3	4
c. my students demonstrate adequate computer/technology skills	1	2	3	4
d. removing the computer/technology *SOL* tests has resulted in students being taught less of this content	1	2	3	4
e. the computer/technology standards of learning are still being taught despite not being tested	1	2	3	4
f. removing the computer/technology *SOL* tests has resulted in students knowing less of this content	1	2	3	4

Appendix B: Survey Validation Measure

Content Validity Measure
This measure is designed to evaluate the content validity of the attached survey instrument. It is adapted from:
Rubio, D. M., Berg-Weger, M., Tebb, S. S., Lee, E. S., & Rauch, S. (2003). Objectifying content validity: Conducting a content validity study in social work research. *Social Work Research*, 27, 94-105.

This survey is designed to measure four constructs:
1. Teachers' perceptions of the effects of high stakes testing on classroom instruction
2. Teachers' perceptions of feeling pressure to improve SOL test scores
3. Teachers' perceptions of the impact of SOL testing on students' knowledge of the Computer/Technology SOL
4. Teachers' perceptions of the impact of socio-economic status of students on their knowledge of Computer/Technology SOL

Please rate the level of representativeness of the corresponding survey item on a scale of 1 - 4, with 4 being the most representative. Space is provided for you to comment on the item or to suggest revisions. You may also write comments directly on the survey instrument.

Please indicate the level of clarity for each corresponding survey item, also on a four point scale. Again, please make comments in the space provided.

Finally, please evaluate the comprehensiveness of the entire measure by indicating items that should be deleted or added. Thank you for your time and your help.

Representativeness:
1 = item is not representative
2 = item need major revisions to be representative
3 = item needs minor revisions to be representative
4 = item is representative

Clarity:
1 = item is not clear
2 = item needs major revisions to be clear
3 = item needs minor revisions to be clear
4 = item is clear

Using the scales shown immediately above, please rate the extent to which the survey items identified below are representative of the following construct. In addition, please rate the clarity of each of the survey items.

Construct #1: *Teachers' perceptions of the effects of high stakes testing on classroom instruction*

	Representativeness				Clarity			
	Is Not			Is	Is Not			Is
Item 4:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 5:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 6:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 7:	1	2	3	4	1	2	3	4

Comments: _____
_____

	Representativeness				Clarity			
	Is Not			Is	Is Not			Is
Item 8:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 16b:	1	2	3	4	1	2	3	4

Comments: _____
_____

Construct #2: *Teachers' perceptions of feeling pressure to improve SOL test scores*

	Representativeness				Clarity			
	Is Not			Is	Is Not			Is
Item 9:	1	2	3	4	1	2	3	4

Comments: _____
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Item 10:	1	2	3	4	1	2	3	4

Comments: _____
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Item 16a:	1	2	3	4	1	2	3	4

Comments: _____
_____

Construct #3: *Teachers' perceptions of the impact of SOL testing on students' knowledge of the Computer/Technology SOL*

	Representativeness				Clarity			
	Is Not			Is	Is Not			Is
Item 11:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 12:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 13:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 16c:	1	2	3	4	1	2	3	4

Comments: _____
_____

	Representativeness				Clarity			
	Is Not			Is	Is Not			Is
Item 16d:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 16e:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 16f:	1	2	3	4	1	2	3	4

Comments: _____
_____

Construct #4: *Teachers' perceptions of the impact of socio-economic status of students on their knowledge of Computer/Technology SOL content*

	Representativeness				Clarity			
	Is Not			Is	Is Not			Is
Item 14:	1	2	3	4	1	2	3	4

Comments: _____
_____

Item 15:	1	2	3	4	1	2	3	4

Comments: _____
_____

Suggestions for additions or deletions:

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Appendix C: Survey Validation Measure Data

Data for Survey Representativeness

Rater #		1	2	3	4	5	6	7	8	9	10	IRA	CVI
Item #	**4**	4	4	4	4	4	4	4	4	4	4	1.0	1.0
	5	4	4	4	4	4	4	4	4	4	4	1.0	1.0
	6	4	3	4	4	4	4	4	4	4	4	1.0	1.0
	7	4	4	4	3	4	4	4	4	4	4	1.0	1.0
	8	4	4	4	4	4	4	4	2	4	4	1.0	1.0
	16b	4	4	4	3	4	4	4	4	4	4	.9	.9
	9	4	4	4	4	4	4	4	4	4	4	1.0	1.0
	10	4	4	4	4	4	4	4	4	4	4	1.0	1.0
	16a	4	4	4	4	4	4	4	4	4	4	1.0	1.0
	11	4	2	4	4	4	4	4	4	3	3	.9	.9
	12	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	13	4	4	3	4	4	4	4	4	3	4	1.0	1.0
	16c	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	16d	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	16e	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	16f	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	14	4	4	4	3	4	4	4	4	3	4	1.0	1.0
	15	4	4	4	2	4	4	4	4	3	4	.9	.9

Number of experts that rated the item the same = Item Inter-Rater Agreement (IRA)
Total number of experts

Number of items with 80% agreement = Measure IRA 18 = 1.0 for Representativeness
Total number of items 18

Number of experts that rated the item a 3 or 4 = Item Content Validity Index (CVI)
Total number of experts

Sum of all item CVI values = Measure CVI 17.7 = .98 for Representativeness
Total number of items 18

Data for Survey Clarity

Rater #		1	2	3	4	5	6	7	8	9	10	IRA	CVI
Item #	**4**	4	4	4	4	4	2	4	4	2	4	.8	.8
	5	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	6	3	3	4	3	3	4	4	4	4	4	1.0	1.0
	7	4	4	4	3	4	4	4	4	4	4	1.0	1.0
	8	4	4	4	4	4	4	4	1	4	4	.9	.9
	16b	4	3	4	3	4	4	4	4	4	4	1.0	1.0
	9	4	4	4	4	4	4	4	4	4	4	1.0	1.0
	10	4	4	4	4	4	4	4	4	4	4	1.0	1.0
	16a	4	4	4	4	4	4	4	4	4	4	1.0	1.0
	11	4	3	3	4	4	3	4	4	3	3	1.0	1.0
	12	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	13	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	16c	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	16d	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	16e	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	16f	4	4	4	4	4	4	4	4	3	4	1.0	1.0
	14	4	4	4	3	4	4	4	4	3	4	1.0	1.0
	15	4	4	4	2	4	4	4	4	3	4	.9	.9

Number of experts that rated the item the same = Item Inter-Rater Agreement (IRA)
Total number of experts

Number of items with 80% agreement = Measure IRA 18 = 1.0 for Clarity
Total number of items 18

Number of experts that rated the item a 3 or 4 = Item Content Validity Index (CVI)
Total number of experts

Sum of all item CVI values = Measure CVI 17.6 = .98 for Clarity
Total number of items 18

Appendix D: Survey Cover Letter

SCHOOL ADMINISTRATION BUILDING
Tenth and Court Streets
Post Office Box 1599
Lynchburg, Virginia 24505-1599

TO: Elementary and Middle School Principals

FROM: Paul McKendrick, Superintendent

DATE: May 17, 2005

SUBJECT: Research Study

A draft of a survey instrument regarding teachers' perceptions of the impact Standards of Learning (SOL) testing has had on curriculum and instruction is attached to this memorandum. This is part of a two-phase, division-wide study being conducted by the Lynchburg City Schools in cooperation with Virginia Polytechnic Institute and State University. This study focuses specifically on teacher opinions regarding the impact of high stakes (SOL) testing on curriculum and its affects on decisions associated with teaching and student learning. The results of this survey will provide us with useful data as we continue to address the requirements of the Virginia Standards of Learning accountability program and those of the No Child Left Behind Act of 2001.

The enclosed instrument was tested using several elementary and middle school teachers. It has been revised to obtain all the necessary data while requiring a minimum amount of your teachers' time. The average time required to complete the sample survey instrument was five minutes.

The department for information technology will send copies of the teacher survey instrument to your school. Please have the teachers in your building complete the survey on or before Friday, June 10, 2005. The completed instruments should be returned to the department for information technology by Wednesday, June 15, 2005.

Please note that data collected from the surveys is anonymous, and all the data will be reported as division-wide results. Any feedback on items that may not have been included on the survey is welcomed.

The second phase of this study collects data on our students' knowledge of the Virginia Computer/Technology Standards of Learning. The 2001 – 02 fifth and eighth grade students in the Lynchburg City Schools were the last to take a required SOL exam in computer/technology. Using the 2002 released version of the Virginia Computer/Technology Standards of Learning assessment, we will test all current fifth and eighth grade students, and the data collected from the 2005 administration of this test will be statistically compared to the data from the 2002 tests for any significance.

The department for information technology will provide each school with the proper number of test booklets and pre-id answer sheets similar to those used in the Division Wide Assessment Program (DWAP). We are asking you to administer the Computer/Technology Standards of Learning Test to all fifth or eighth grade students in your building at some point during the week of June 6 – 10, 2005. Special attention must be given to testing conditions to ensure that they are the same as those used when testing for the four content areas. Students must be given enough time to complete the test. Special education students may take the test under any accommodations provided for in their Individualized Education Plan for other SOL testing.

Answer sheets and test booklets should be collected by Friday afternoon, June 10, 2005. The completed answer sheets and tests should be returned to the department for information technology by Wednesday, June 15, 2005, for scanning and scoring.

Data collected from the test administration will be reported as division-wide data. No students can or will be issued a grade on the exam. Test data will not be used as comparative data between schools.

It is important to note that the data collected must be true indicators of the knowledge our students currently have of the computer/technology standards. Please do not conduct review sessions or any other instruction outside the normal routine prior to giving the test.

Your cooperation and participation in this project are greatly appreciated. If you are interested in a summary of the results, you may contact Gregory P. Sullivan, director for information technology, at 522-3700, #172.

cc: Gregory P. Sullivan

PM/wls

Appendix E: Institutional Review Board Letters

SCHOOL ADMINISTRATION

Tenth and Court Streets
Post Office Box 1599
Lynchburg, Virginia 24505-1599

David M. Moore, Chair
Institutional Review Board
Research Compliance
CVM, Phase II (0442)
Virginia Tech
Blacksburg, Virginia

May 16, 2005

Mr. Moore:

The purpose of this letter is to inform the Institutional Review Board of our decision to allow Mr. Gregory P. Sullivan to conduct two phases of research within the Lynchburg City Schools for his dissertation study.

The first phase will involve the administration of a survey instrument to all elementary and middle school teachers in our division. The survey is designed to gather data concerning teachers' perceptions of the impacts of Standards of Learning (SOL) testing on curriculum and instruction. We understand this study is concerned specifically with our teachers' views on the impact of high stakes (SOL) testing on curriculum, and its effects on their decision-making regarding teaching and student learning. The results of Mr. Sullivan's research will provide us with useful data as we continue to address the requirements of the Virginia Standards of Learning accountability program and those of the No Child Left Behind Act of 2001.

We have been assured the survey instrument has been tested with a sampling of elementary and middle school teachers. It has been revised to obtain all the necessary data while requiring a minimum amount of our teachers' time. We will require that the data collected from the surveys be anonymous. There is no identifying information on the instrument. All data will be reported as division-wide data.

The Lynchburg City Schools will also participate in the second phase of this study, which is interested in collecting data on our students' knowledge of the Virginia Computer/Technology Standards of Learning (SOL). The 2001 – 2002 fifth and eighth grade students in the Lynchburg City Schools were the last to take a required SOL exam in computer/technology. We have this data stored electronically. Using the 2002 released version of the Virginia Computer/Technology Standards of Learning assessment, Mr. Sullivan will be testing all current fifth and eighth grade students division-wide. The data collected from the 2005 administration of this test will be statistically compared to the data from the 2002 tests for any significance.

We have been assured data collected from the test administration will be reported as division-wide data. No students can or will be identified individually. No student will be issued a grade on the exam.

Mr. Sullivan has our full cooperation and participation in this project. We will be greatly interested in a summary of the results. If you have any questions about the contents of this letter, please contact me at 434-522-3700, #101.

Sincerely,
Paul McKendrick,
Superintendent

Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Institutional Review Board

Dr. David M. Moore
IRB (Human Subjects)Chair
Assistant Vice President for Research Compliance
CVM Phase II- Duckpond Dr., Blacksburg, VA 24061-0442
Office: 540/231-4991; FAX: 540/231-6033
email: moored@vt.edu

DATE: June 2, 2005

MEMORANDUM

TO: Mark E. Sanders Teaching and Learning 0313
Gregory Sullivan

FROM: David Moore

SUBJECT: **IRB Exempt Approval:** "What Gets Tested Gets Done: Assessing the Computer/Technology Standards of Learning in Virginia" IRB # 05-370

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of June 2, 2005.

Virginia Tech has an approved Federal Wide Assurance (FWA00000572, exp. 7/20/07) on file with OHRP, and its IRB Registration Number is IRB00000667.

cc: File
Department Reviewer: Barbara Lockee

Appendix F: *CT/SOL* Test Validity and Reliability Procedures

The 2001 – 2002 Virginia Standards of Learning Assessment Technical Report was published by the Virginia Department of Education (VDOE) (2003) to inform users and other interested parties about the development, content and technical characteristics of the Virginia 2001 – 2002 *SOL* assessments. It provided information from the 2001 *SOL* testing cycle which included the spring 2002 administration.

According to this report, summarized in this Appendix, creating the *SOL* assessments was a complex and time consuming process. It required involvement from the Virginia Department of Education, Harcourt Educational Measurement, local school divisions and local education agencies (LEAs). Teachers, administrators, and content specialists from all over Virginia were recruited for the different test development committees. Committee members came to Richmond on several occasions to work on the tests. Harcourt Educational Measurement in San Antonio, Texas and the VDOE in Richmond were responsible for the development process activities (VDOE, 2003).

Designing Assessment Blueprint and Item Specifications

Harcourt Educational Measurement's staff reviewed the Virginia *SOL* and developed assessment blueprints for each grade and content area. The blueprints identified reporting categories within which to group *SOL*, as well as more specific content, knowledge and skills to be tested under. Any item on the test must be matched to an objective on the blueprint. In addition, the *C/T SOL* Content Review Committee identified items that could not be tested by a multiple-choice item format and they were excluded from the blueprint. By setting the number of test items included in each reporting category the test blueprints made it possible to determine the relative emphasis given to that reporting category. The test blueprints thus provided the structure for constructing test forms. (VDOE, 2003).

In December 1996, the Content Review Committee reviewed and modified the draft *C/T SOL* test blueprints. The committee was organized into grade-specific groups to efficiently judge the grade and content appropriateness of the blueprints (VDOE, 2003). Committee members edited the number of items in each reporting category in the computer/technology content area to reflect the emphasis they believed that reporting category should have on the *SOL* test. Once approved by the committee members, the draft blueprints were used as guides in the development of the *C/T SOL* field tests.

Test item specifications were developed and used as general rules or guidelines for the format and layout of test items. They ensured consistency across tests and content areas in the *SOL* assessments. For example, one specification was that all multiple-choice items have four possible choices. Harcourt Educational Measurement assessment development specialists drafted item specifications for the *C/T SOL* test by grade level. These specifications provided item writers, item reviewers, and other Harcourt Educational Measurement staff with the guidelines necessary to produce test questions for the *C/T SOL* assessments (VDOE, 2003).

Upon completion of the item specifications, Harcourt Educational Measurement content specialists and item writers constructed multiple-choice items. Working with the VDOE, the Harcourt assessment development team facilitated the review of the draft multiple choice computer/technology test items. During the pre-review orientation, computer/technology content

committee members were taught the item review process. They were instructed on how to judge items on the basis of their difficulty, clarity, appropriateness, and relevance to the purpose of the test. Reviewers also critiqued each item for its interaction with other items, the appropriateness of any accompanying artwork, the correctness of keyed responses, and the plausibility of the distracters (VDOE, 2003).

During the item review process, the Content Review Committees identified potential item bias in the areas of gender, ethnic, religious, socioeconomic and regional characteristics. Committee members noted their concerns about items they perceived as biased in content or format. As a result of this review process, some items were eliminated from the prospective field test item bank, and others were marked for revision and inclusion at a later date.

Field tests of the *SOL* assessments were conducted in the spring of 1997 with the administration of test items to a sample of students across Virginia. The field tests collected information about test items, not about the students who took the test. Statistical information was gathered, such as the percentage of students answering each item correctly. A difficulty rating for each item was established. The field testing also provided data on the ability of each item to discriminate between those students who scored well on the test and those who did not (VDOE, 2003).

As a result of the field testing, representative teachers, students, and administrators across Virginia had an opportunity to become familiar with the test's format and administration procedures. The process also helped identify items that were potentially biased by ethnicity or gender, and those items were marked for exclusion. The spring 1997 *SOL* field tests provided information about the newly developed test items for the staff at Harcourt Educational Measurement and members of the Content Review Committees. The information provided by the field tests enabled them to make informed decisions about test items and the construction of test forms (VDOE, 2003).

Field Test Form Construction

To ensure that sufficient high-quality test items were available for the spring 1998 operational assessments, approximately 180 items were included in 5 field test forms Only items that were acceptable to members of the computer/technology item review committee were included. Each field test form was developed to closely reflect the specifications of the computer/technology test blueprint. Each computer/technology form had approximately 30 percent of its items in common with the other forms. Forms consisted of 28 to 45 unique items and 12 to 18 common or "linking" items. The common-item test design provided the link used to place the difficulty estimates for all of the items in each subject area at each grade level on a common scale (VDOE, 2003).

Test Administration Preparation and Materials

Pre-test workshops were held across the state prior to the field tests. The workshops provided the representatives of all the local school divisions with an overview of the tests' content, security expectations and procedures for completing the answer documents. They also considered the receipt, distribution, and return of test materials. Three manuals were developed for use during the administration of the *SOL* tests. A *Division Director of Testing Manual, School Coordinator's Manual,* and *Examiner's Manual* provided information about the receipt,

distribution, security, and return shipment of test materials. In addition to the manuals, directions for administering each *SOL* test were developed and distributed (VDOE, 2003).

Field Test Administration: Spring 1997

In the spring of 1997, every student in grades 5 and 8 participated in field testing the *Computer/Technology SOL* assessments in specified content areas. This ensured that a large sample was tested allowing for analysis of item data. The aim of the sampling procedure was to obtain a representation of students that mirrored the overall composition of Virginia. Students took just one field test in one content area. For example, students in one fifth-grade class in a school took a Computer/Technology field test, while fifth-grade students in another class took a Mathematics field test (VDOE, 2003).

Field test administration materials and procedures were the same as those of the operational tests. Separate answer sheets incorporating many of the features of the operational answer sheets were used to collect the demographic data and other information necessary to analyze the results of the field test. Wherever possible, the field test forms were modeled on the test blueprints to mimic the operational test forms.

Field Test Statistics

Descriptive statistics were derived from the spring 1997 field test for each computer/technology form and reporting category. They included raw scores, means, and standard deviations by demographic characteristics, form, and reporting categories. The demographic variables were: grade level, gender, ethnicity, limited English proficiency status, disability status, and special test accommodations status.

Results from the field test administration provided a basis for including items in the operational test forms and constructing equivalent forms. They included item statistics for: multiple-choice items and forms, Rasch item statistics and differential item functioning (DIF) statistics. According to the VDOE (2003), the statistics calculated from the computer/technology multiple-choice items included:

- Numbers of students tested
- Traditional difficulties (*p*-values)
- Item-option response distributions for all respondents, for high-, middle-, and low-ability groups, and by gender and ethnic group
- Biserial and point-biserial correlations

A Rasch Item Response Theory (IRT) method of computing DIF statistics provided item difficulty estimates among demographic groups. Under this model, the only reason for differences in item difficulty statistics was some group characteristic other than achievement. When the Rasch item difficulty estimates between groups were statistically different, items came under further scrutiny. This procedure compared white and African-American students, white and Hispanic students, and male and female students. Rasch item difficulty differences greater than a value of one standard error of estimate were tagged for further review (VDOE, 2003).

Other DIF statistical methods such as the Mantel-Haenszel procedure were used to calculate the probability that one demographic group was more likely to answer an item correctly than another group, when the two groups were of equal ability. This information was useful in reviewing

items in the computer/technology tests for potential bias. High values of the Mantel-Haenszel Alpha indicated that an item interacted differently among equally able students in the reference and comparison groups. The Mantel-Haenszel procedure compared white and African-American students, white and Hispanic students, and male and female students. Any Mantel-Haenszel group differences that exceeded a chi-square significance level of 0.10 were identified and given further review (VDOE, 2003).

Item Data Review

Following the field testing, in the summer and fall of 1997, the Computer/Technology Content Review Committee met for a final examination of items prior to their inclusion in the *C/T SOL* item bank. The item bank, maintained by Harcourt Educational Measurement, was the collection point from which items for current and future forms of the *C/T SOL* assessments were drawn. The item statistics the committee reviewed included the Mantel-Haenszel procedure and Rasch item difficulty group differences previously described. Committee members interpreted item statistics and judged the quality and appropriateness of each item in the tests. They also reviewed items for fairness and possible bias. This process gave the C/T Content Review Committee members an opportunity to discuss their concerns about item content, format, bias, and fit. Participants completed individual rating forms which were tabulated and used to make inclusion decisions about the items being included in the *C/T SOL* test bank and, subsequently, on the operational test forms. Only items that passed all stages of the development process were added to the item bank and, therefore, became eligible for use on future *C/T SOL* assessments (VDOE, 2003).

According to the VDOE (2003), for the Grade 5 *C/T SOL* test, 150 items were reviewed by the C/T Content Committee with 146 (97%) passing all stages of the process. For the Grade 8 test, 200 items were reviewed by the committee with 151(76%) passing all stages of the process for inclusion in the *C/T SOL* test item bank.

In addition to assessing individual items, the C/T Content Review Committee members also reviewed draft item specifications and draft blueprints. Committee members offered suggested revisions such as adjusting the total number of items on the test, adjusting the number and/or type of reporting categories, and adjusting the number of items in each reporting category. The final blueprints were used to create the first operational test forms administered in the spring of 1998. Published copies of the blueprints were distributed to all public school teachers in Virginia.

The C/T Content Review Committee reconvened later in 1998 to review operational forms of the *C/T SOL* tests. Committee members determined the content validity and equivalency of two forms of each grade level computer/technology test. While the previous committee reviews were concerned with individual questions, the focus of this review is the full operational test forms. At this stage there may be additional minor edits or revisions (VDOE, 2003).

Item Bank Construction

The number of test forms to be constructed each year and the need to replace items that would be released to the public necessitated the availability of a large pool of items. The *C/T SOL* item bank was maintained by Harcourt Educational Measurement as computer files and paper copies

until testing was halted in the fall of 2002. Up to that time, the computer/technology test items were readily available to both Harcourt and VDOE staff for reference, test construction, test booklet design, and printing. Harcourt Educational Measurement maintained a computerized statistical item bank to store supporting and identification information on each item. According to the VDOE (2003), the information stored in this item bank included for each item:

- Code number
- Grade level
- *SOL* and reporting category
- Field test date
- Test form
- Item statistics

The statistical item bank also contained information from the data review meetings. The item statistic information was used during test construction to calculate and adjust for test difficulty, content coverage, and pre-equating test forms, and to print individual test statistics as needed. After the spring 1998 operational administration of the *C/T SOL* assessments, the item bank Rasch scale statistics were re-calibrated using all of the student test responses. The re-calibrated scale served as the base scale.

Reliability

According to the VDOE (1999) in constructing the *Virginia C/T SOL* tests, the developers used Kuder-Richardson Formula #20, or the KR-20, as the statistical measure of test reliability. The Kuder-Richardson is a traditional procedure designed to determine the degree to which the test questions consistently measure the same body of content and skills. KR-20 values range from 0 to .99. Computer/technology test developers aimed for the test's KR-20 value to be as high as possible, with .99 being virtually unreachable. KR-20 values on the 30 question Grade 5 *C/T SOL* test were .81. The values on the 40 question Grade 8 *C/T SOL* test were .86 (VDOE, 1999).

In summary, all items that appeared on the spring 1998 *C/T SOL* tests were subjected to the validity and reliability procedures outlined in this Appendix. All items that appeared in subsequent forms of the *C/T SOL* tests up to and including the spring 2002 version were developed in this same manner and subjected to the same procedures.