ARLINGTON PUBLIC SCHOOLS
MATHEMATICS EVALUATION REPORT
February 2012

Prepared by the Office of Evaluation

Response from the Mathematics Office

- Margaret Chung, Supervisor
- Laura Kelanic Taylor, Secondary Specialist
- Sarah Minervino, Elementary Specialist
- Mariola Aguilar, ESOL-HILT Math Specialist

Table of Contents

Executive Summary

Introduction

This study investigates the mathematics academic outcomes for Arlington Public Schools (APS) from 2007–2011 for all grades from kindergarten through Grade 12. It is the second evaluation of mathematics and responds to the recommendations from the earlier study done in 2005.

The study addresses the following three questions:

1. How well did APS implement mathematics?
2. What were the outcomes for the intended recipients?
3. How satisfied were the users?

Mathematics Program

APS envisions that math instruction in Arlington schools will enable all students to gain increased mathematics knowledge so that they can problem solve, use the tools of mathematics, and make real-world connections in order to access future opportunities and build successful lives.

The Mathematics Office facilitates this goal by leading a culture of continual learning among teachers. Its mission is to implement best instructional practices and curriculum design aligned to division and state goals.

The APS mathematics program is based on the following three goals:

1. All students will be appropriately challenged and supported in learning mathematics as a community of learners.
2. Teachers will use their content knowledge and reflective pedagogical practices to effectively teach students the APS and state curriculum.
3. All students will complete Algebra I successfully by Grade 8 so that they can have the opportunity to pursue a higher education and a career of their choice.

Methodology

The APS study uses three sources of information to assess program implementation. The Classroom Assessment Scoring System (CLASS), developed at the University of Virginia's Curry School of Education, assesses the interactions between students and adults. The observation checklist used in the 2005 evaluation assesses critical areas of mathematics content that are not addressed by CLASS. The two tools together provide a comprehensive view of mathematics instruction in APS. These sources are complimented by a review of secondary mathematics enrollment patterns, presented both as annual measures, and within a longitudinal study conducted for APS by the Hanover Research Council. A variety of assessments are used

to evaluate student outcomes in mathematics, and a survey of principals provides feedback on their perceptions about the program and future needs.

Findings

Strengths

- The quality of math instruction in APS has improved across elementary schools as evident in observations, high passing rates on state assessments, and increased scores on national assessments. Improvements may be the result of
    - The addition of math coaches at all the elementary schools which has enabled the math office to use a "train the trainer" model to effectively implement math professional development across the district.
    - Systemic efforts to develop teacher understanding and use of concept building and higher levels of cognitive demands in mathematics instruction.
    - The focus on providing a minimum of 60 minutes of mathematics instruction daily. The disruptions identified in 2005 were not an issue in this evaluation.
- APS mathematics instruction provides students across all grade levels with a strong foundation of emotional and organizational support that is critical to learning and academic success.
- As more students take AP mathematics courses, the passing rate continues to increase on many tests.
- Scores for mathematics on the Stanford 10 show solid gains for most groups when comparing APS and national percentile scores. The increases were notable for Black, Hispanic and Asian students, students identified as limited English proficient and economically disadvantaged students. Students identified with a disability were the only APS group that did not show progress.

Areas That Need Improvement

- Among all students, white students are more likely than others to enroll in accelerated mathematics course.
- Gaps in achievement remain, but for most groups the gaps have narrowed mathematics SOL assessments.
- More work needs to be done to ensure that students with disabilities are participating in math instruction that prepares them for success.
- There are gaps in enrollment in Advanced Placement and International Baccalaureate programs. Increases are not consistent among all groups, and, in many cases, the increases are too small to report.
- The process for administering and monitoring the results of quarterly math assessments needs to be more useful for teachers, math coaches, and central office administrators.

There needs to be more support for direct instruction and for monitoring by administrators.

- APS needs to provide a more accurate report on the math experiences of APS students so that accurate conclusions can be drawn. Reporting should be adjusted to clearly communicate that acceleration is a positive experience.
- Given the results from the current study, APS lags behind Virginia on a number of Standards of Learning (SOL) related measures. APS needs to continue monitoring middle school instruction to ensure that students have the necessary tools and knowledge for success.

Recommendations

The study results have shown that there has been improvement in math instruction in APS; however, more needs to be done. The following recommendations are provided as suggestions for continued work.

- Use the results of this study to monitor students' progress and inform future instruction.
- Implement culturally responsive teaching strategies into mathematics instruction through curriculum revision and professional development.
- Standardize new enrollment reports so that they are accessible to teachers, math coaches, and administrators across APS.
- Identify groups of students who are not making expected progress in mathematics in order to coordinate efforts to provide better instruction.

The complete report that follows provides the necessary detail for this summary.

Staff Response and Action Plan

The mathematics program evaluation report informs the mathematics office with comprehensive data on observations in classroom instruction, enrollment trends, and multi-year results on state and national assessments. Based on this evaluation, the mathematics office will have an accurate and realistic framework from which to move forward in our work to continually provide APS students with targeted and innovative mathematics instruction.

According to observations collected using CLASS and the mathematics checklist on classroom instruction:

- Providing students with emotional and organizational support in the classroom are strengths across all grade levels.
- A targeted area for all grade levels is the need to increase discourse about mathematical concepts both between students to teachers and student to student. Providing students with meaningful interactions and quality feedback will help to implement differentiated instruction and culturally responsive teaching strategies.
- Secondary classrooms will need to respond to adolescent perspectives by capitalizing on students' social and developmental needs and providing greater value to students' ideas and opinions.
- Secondary classrooms will need to increase the cognitive demand of tasks and focus lessons on connecting prior learning to new learning and deepening students' conceptual understanding of mathematics.

Enrollment trends indicate:

- A continued gap in enrollment in accelerated* and advanced math courses for Hispanic, Black, LEP, and SPED students.
  (*Beginning in 2012-2013, Algebra 1 in grade 8 will be categorized as a grade level and not as an accelerated course. The same is true for Geometry in grade 9 and Algebra II in grade 10.)

State and national assessment results indicate:

- Participation in AP assessments increased and the percentage of students passing the AP test increased.
- Participation on SAT's increased from 2007-2010 in the following subgroups: Hispanic, Asian and Black students.
- Significantly lower pass rates on the math SOL's for the following specific subgroups: Black-ED (Economically Disadvantaged)-SPED, Hispanic-ED-SPED-LEP, Black-SPED, and Hispanic-ED-LEP (p. 85, Table 22).

According to the survey responses from elementary school principals on the mathematics retreat:

- Most principals feel better informed on the "importance of discourse and questioning" and the implications to the changes in the SOL's and APS curriculum.
- Principals need targeted mathematics support to better meet the needs of SPED students.

The positive impacts of the following implementations of recommendations from the previous evaluation are:

- Elementary math coaches planning with grade level teams and providing ongoing instructional support to teachers has increased the capacity for leadership and innovation in mathematics instruction. The success of this model has helped implement coaches at each of the middle schools and one of the high schools.
- Expanded and uninterrupted math instruction at the elementary level has raised the quality of math instruction in the classroom.
- Providing content focused professional development to teachers has improved the accuracy and depth of mathematics instructions in grades K-8.

ACTION PLAN

The program evaluation also provides guidance in our next steps for continued development of the mathematics program. The recommendations below outline actions that our office has already started and will continue to work on as we strive to make improvements that support student understanding of mathematics.

Recommendation 1. Use the results of mathematics assessments to monitor students' progress and to inform instruction that ensures student achievement.

Response: Mathematics is already acting upon this recommendation in a number of areas.

a. Along with other instructional programs, math is monitoring the 2011–12 initial implementation of the electronic formative assessment benchmark system. We are working with math coaches at the initial schools to develop a process for using mathematics results to help teachers, school administrators, and other APS staff to monitor students' progress in mathematics. This effort will grow as we expect to:
    - Adapt the initial implementation process with all schools once the full implementation begins in 2012–13.
    - Phase out the use of the current APS-developed quarterly mathematics assessments once the formative assessment benchmark system is fully implemented.
    - Implement the ipGrowth model to monitor individual student learning over time.

b. Mathematics staff is using the results collected through the formative assessment benchmark system to inform mathematics instruction. We have already started to work with math coaches and teachers to develop consistent practices to identify students who need additional support and extension in mathematics. As we begin to have greater access to student results, we plan to develop and implement differentiated instruction for all students.

c. Design and implement valid and reliable mathematics assessments, administered through the formative assessment benchmark system, that gauge students' skills and abilities.

These results will inform APS about student achievement at key points in time. Plans are in place to

- Use the ipGrowth Model to measure the individual progress of each student from the beginning to the end of the year for Grades 3–8.
- Administer quarterly benchmark assessments or Grades K–8 and at the beginning and the end of the year for kindergarten, Grade 1, and Grade 2.

Recommendation 2. Curriculum revisions and ongoing professional development will focus on effectively implementing culturally responsive teaching strategies into mathematics instruction.

Response: A number of initiatives are currently underway to ensure that culturally responsive teaching strategies are central to mathematics instruction.

a. Math coaches are facilitating math discourse to be embedded and integrated into kindergarten through Grade 8 math instruction to increase precise and deeper levels of conceptual understanding of mathematics. Research has shown that the effective use of math discourse equips students to communicate their own ideas about mathematics and explain their reasoning.

b. Elementary and secondary math coaches and teachers are being trained to use the Sheltered Instruction Observation Protocol (SIOP) in conjunction with math discourse to develop strategies for language support for LEP students in mathematics.

c. STEM applications are being integrated into the K–12 curriculum and supported through ongoing professional development, with the objective of increasing the cognitive demand of tasks and challenging students to problem-solve real-life situations. Collaborations with post-secondary institutions will need to be developed to create deeper connections to engineering design models.

d. Professional development is addressing

   - Effective use of the newly adopted resources to differentiate instruction for all students.
   - The use of technology to enhance instruction and increase student engagement, collaboration, and inquiry based learning.

e. Expand content academies for elementary and secondary level teachers to increase their use of precise and accurate mathematical language and content in classroom instruction.

Recommendation 3. Standardized enrollment reports currently being tested by Enterprise Solutions will be available to anyone who has access to eSchool+.

Response: Over the coming months we hope to work with Enterprise Solutions to ensure that standardized reports are accessible to teachers, math coaches, and administrators across APS. Once the reports are available, mathematics staff will implement processes to help teachers and

administrators learn about and find value in regularly monitoring their enrollment data. Specific monitoring reports include the following:

- Enrollment of eighth-grade students into Algebra 1 or higher and 11th-grade students into Algebra 2 or higher.
- Provide targeted intervention and curricular support to identified subgroups who are underrepresented in accelerated math courses.

Recommendation 4. More coordinated efforts will be undertaken with the staff that provides instruction to identified groups of students who are not making expected progress in mathematics.

Response: The math office is already collaborating with other offices.

a. Collaboration with ESOL-HILT is underway to develop a standards-based curriculum for Secondary HILT math students and to monitor students' progress using quarterly assessments. As a result of this work, we expect future efforts to focus on:
    - Math coaches monitoring LEP students' enrollment into appropriate grade-level and accelerated math courses.
    - Require math certified teachers to teach all secondary math courses, including HILT math courses.
    - The 2012 evaluation of APS services for LEP students will identify ways that schools and program staff can work together to improve content instruction for English language learners and for students who have exited the program and moved into the standard curriculum. SIOP training for all secondary math teachers will provide effective content based language support strategies for teachers to use in the classroom.

b. The math office is collaborating with the Office of Minority Achievement in the following targeted efforts.
    - The Office of Minority Achievement is guiding a yearlong professional development program at four elementary schools that completed Year 1 of the cultural competence training. In collaboration with the Math Office, the work is focused on implementing the new mathematics curriculum, with an emphasis on developing culturally responsive student and teacher interactions through math discourse.
    - Math is leading a professional development plan (PDP) group that focuses on improving culturally responsive teaching strategies. There are at least 60 secondary math teachers participating in this PDP that focuses on collegial coaching and reflective practice to improve instruction.

c. The math office plans to collaborate with the special education department to develop an action plan for 2012–13 and beyond to provide students with disabilities with targeted math intervention and support.

- Offices will monitor the use of the elementary intervention pilot program "Do the Math" and plan to expand implementation if the model is effective. The 2012 evaluation of APS services for students identified with disabilities will identify ways that schools and program staff can work together to improve content instruction to students with instructional assessment team plans, 504 plans, or individualized education plans.
- Collaboration with Region IV specialists and George Mason University's T/TAC is being developed to create a consortium of teachers to plan and implement standards based lessons for supporting mathematics instruction for SPED students.

Definitions and Acronyms

Acceleration or Accelerated Instruction
Acceleration is an educational strategy that provides opportunities for students to achieve goals at a more rapid pace. Acceleration can be within a grade-level curriculum (teacher decision) or across grade-level curricula. Students are recommended for acceleration based on end of year assessments (SOL's and county assessments) and teacher recommendations.

Advanced Courses
A set of courses which include Advanced Placement, International Baccalaureate, and intensified courses in high school, and algebra, geometry and intensified math in middle school.

Adequate Yearly Progress

Adequate Yearly Progress represents the minimum level of improvement that schools and school divisions must achieve each year as required by ESEA.

Advanced Placement (AP)
An intensive program of college-level curricula and examinations developed by the College Board that provides high school students with an opportunity to earn advanced placement, college credit, or both, at participating universities and colleges across the country. The AP program offers students an opportunity to develop their academic strengths through rigorous curricula and challenging national examinations and exposes them to academic experiences usually reserved for college students.

AP Tests
The AP tests are developed by The College Board and measure student achievement on skills and subject-area content outlined in the AP course description. Arlington Public School students are required to take a test for each AP course in which they are enrolled. Depending on the grade attained, the student may get college credit or placement in higher level college courses.

APS
Arlington Public Schools

Assessment
Is a system of collecting data to better understand: (a) the current knowledge (facts), understandings (principles and concepts), and skills (e.g., literacy) of students; (b) the readiness (prior mastery of knowledge/understandings/skills), interests (students' curiosity and passion to

know, understand, or do more), and learning profiles (preferred learning styles or intelligences) of students (Tomlinson, 1999).

Differentiation or Differentiated Instruction (DI)
This instructional approach recognizes that all students must master a common body of knowledge and skills, but each student learns a different way and needs an approach most appropriate to his or her learning needs. Differentiation relates to content (what students learn), process (how students learn), and product (how students demonstrate what they've learned). Students differ in readiness (prior mastery of knowledge, understandings, and skills), interest (curiosity and passion to know, understand, or do more), and how they prefer to learn (Tomlinson, 1999). A teacher acts responsively to a learner's needs—that is, meeting the student where he or she is in the curriculum.

Economically Disadvantaged (ED)
A student who is a member of a household that meets the income eligibility guidelines for free or reduced-price school meals (less than or equal to 185% of Federal Poverty Guidelines)

English Language Learner (ELL)
A student who is learning English and progresses through different stages of English language proficiency. The No Child Left Behind Act of 2001 (NCLB) and other federal legislation refers to ELLs as limited English proficient (LEP) students.

English as a Second Language (ESL)
ESL and bilingual programs offer special resources and services to school staffs in meeting the needs of limited English proficient students.

English for Speakers of Other Languages/High Intensity Language Training (ESOL/HILT)
The English as a second language program in APS.

Formative Assessment
Formal and informal assessment procedures employed by teachers during the learning process in order to modify teaching and learning activities to improve student attainment.

Full-Time Equivalent (FTE)
Allocation of staffing positions, so that 1.0 FTE equals a full-time position, 0.5 equals a half-time position.

High-Level Questioning
A strategy for differentiating instruction that provides for presentation of questions that draw on advanced levels of information, require leaps of understanding, and challenge the thinking of all students.

Individualized Education Plan (IEP)

When a student becomes eligible for special education services, the school staff, the parents, and the student (when appropriate) develop an individualized statement of the special education and related services that will be provided to the student (the IEP), which is updated at least annually during a student's eligibility for special education.

Intervention Assistance Teams (IATs)
In many cases, modifications to the regular education program will address a student's particular needs without evaluations or special education services. IATs meet informally to help promote a student's success in the regular education classroom. Intervention strategies, such as alternative or modified learning instruction and/or behavior management techniques, may be developed to:

- Improve the student's academic performance
- Improve the student's behavior
- Improve and refine teaching skills so that the classroom teacher is able to teach students with diverse educational needs.

If the approaches offered through the IATs are effective, a student will experience educational success within the general education program. This success will eliminate special education as an alternative.

International Baccalaureate Program (IB)
An internationally recognized advanced academic program for 11th and 12th graders. This program provides college-level course work in six academic areas and provides high school students with an opportunity to earn advanced placement, college credit, or both, at participating universities and colleges across the country.

IP Growth Model™
APS is implementing, as part of the formative assessment system, the assessment solution ipGrowth™ to measure growth in student achievement by comparing scores from the same student over time.

Limited English Proficient (LEP)
A term used in federal legislation to describe English language learners.

Mathematics Content Academies
Professional development offerings for teachers that deepen their mathematics content knowledge. Each course in the series is 15 hours. The content academies are offered during the spring and summer semesters. 2011 content academies included: Investigate Numbers: Numbers and Operations; Breaking Up is Hard to Do: Fractions, Decimals, and Percents; and Arithmetic to Algebra.

No Child Left Behind Act (NCLB)
The 2002 reauthorization of the Elementary and Secondary Education Act. This legislation provides funding to states to assist in the education of English language learners.

Norm Referenced Test
A norm referenced test estimates the position of the tested individual in a predefined population, regarding the trait being measured. This estimate is derived from the analysis of test scores and possibly other relevant data from a sample drawn from the population. This type of test identifies whether the test taker performed better or worse than other test takers, but not whether the test taker knows either more or less material than is necessary for a given purpose.

Normal Equivalent (NCE) Scores
Used in this evaluation in reports on the Stanford 10, these scores result from the division of the normal curve into 99 equal units. The scores are used for research purposes.

Professional Development Plan (PDP)
The PDP is a component of the teacher evaluation system that focuses on professional development. The teacher designs a professional growth plan in collaboration with his or her administrator.

- The goals of the plan are associated with student learning.
- The plan may be individually developed or collaboratively developed with a team of teachers. If developed with a team, each teacher has implementation responsibility.
- The plan addresses one or more of the following professional components: planning and preparation, classroom environment, instruction, and professional responsibility.
- The plan is reviewed annually with the administrator to assess progress. A description of the process is written by the teacher, signed by the teacher and administrator, and placed in the teacher's personnel file.

Science, Technology, Engineering, and Mathematics (STEM)
An approach to education that is designed to modernize the teaching of mathematics and science by incorporating technology and engineering into the regular curriculum. STEM curriculum focuses on problem solving, discovery, and exploratory learning. The approach requires students to actively engage a situation in order to find a solution

Sheltered instruction Observation Protocol (SIOP)
An approach to teaching that promotes language development and content-area learning. Content-area teachers and English as a second language (ESL) teachers adapt grade-level content lessons to the students' levels of English proficiency. Teachers focus on English language development and help students increase their proficiency in English.

Special Education (SPED)
A service especially designed and at no cost to the parent/guardian that adapts the curriculum, materials or instruction for students identified as having educational or physical disabilities and tailored to each student's needs and learning style and provided in a general education or special education classroom, home, hospital, separate school or other setting

Standardized Tests
Standardized tests are designed in such a way that the questions, conditions for administering, scoring procedures, and interpretations are consistent and are administered and scored in a predetermined, standard manner

Stanford 10 Achievement Test
The Stanford 10 is a standardized, norm-referenced test that compares student results to a national sample of students from the same grade level that was tested at the same time of the year.

Standards of Learning
The Virginia Board of Education's curriculum objectives and goals for Virginia's students in each grade level and in each subject.

Standards of Learning Tests (SOLs)
State-mandated tests administered to students in Virginia that measure the SOL goals and objectives. These tests are used for determining school accreditation and adequate yearly progress (AYP).

Summative Assessment
The assessment of learning that summarizes the development of a learners understanding at a particular point in time.

504 Plan
A legal document under the provisions of the Rehabilitation Act of 1973. It is designed to plan a program of instructional services to assist students with special needs who are in a regular education setting.

Section I: Background

This study investigates the academic outcomes in mathematics for Arlington Public Schools (APS) students, from kindergarten through Grade 12, for five school years concluding with 2010–11. This evaluation is the second evaluation of mathematics in response to the APS policy and procedures (45-3) for accountability and evaluation.

This report addresses the following evaluation questions:

- How well did APS implement the mathematics program?
- What were the outcomes for the intended recipients?
- How satisfied were the users?

The report is divided into three sections: (1) background, which describes the mathematics program and summarizes the evaluation design and methods; (2) findings regarding mathematics implementation and outcomes; and (3) recommendations for further program improvement.

Mathematics Program Description

Students who learn challenging mathematical concepts and ideas gain access to higher-level mathematics courses, which, in turn, lead to increased knowledge and opportunities. The APS vision for mathematics is that all Arlington students will be able to construct a comprehensive and rigorous understanding of mathematics that they can communicate and connect to the world around them. All students will be empowered and equipped to problem-solve and use the tools of mathematics to build and innovate their future worlds.

The mission of the Mathematics Office is to establish and lead a culture of continual learning among teachers toward the implementation of best instructional practices and curriculum design, aligned to division and state goals, in order to challenge students to think for themselves and engage in a purposeful community of learning.

Mathematics Goals

The APS mathematics program is based on the following three goals:

- All students will be appropriately challenged and supported in learning mathematics as a community of learners.
- Teachers will use their content knowledge and reflective pedagogical practices to effectively teach students the APS and state curriculum.
- All students will complete Algebra I successfully by Grade 8 so that they can have the opportunity to pursue a higher education and a career of their choice.

The APS mathematics program is based on the initiatives, philosophies, and requirements from the following entities:

- Virginia Department of Education (VDOE)/ Mathematics Standards of Learning (SOL)
- National Council for Teachers of Mathematics (NCTM) Content Standards
- 2008 National Mathematics Panel Report

The uniting thread of these entities is the emphasis on students developing conceptual understanding, computational and procedural fluency, and problem-solving skills, believing that they are equally important and mutually reinforcing of each other. The APS mathematics instructional program addresses all three components of the mathematics program by using a variety of methods and approaches.

Elementary School Mathematics

Planning and Instruction

The *2009 Standards of Learning Curriculum Framework* is used to plan and guide all math instruction consistently and throughout the school system. Teachers use the 2011–12 APS grade-level pacing guides, which include the newly adopted *Math Expressions* units. Grade-level teachers and math coaches do grade-level planning, using the framework, pacing guides, and other resources to promote the teaching of math concepts for understanding. Coaches model effective content-focused teaching strategies and guide teachers through reflective and learning-focused conversations to improve instructional practice. Teachers monitor student progress and use student data to plan differentiated instruction to target the learning needs of diverse learners. Teachers facilitate math discourse to deepen students' understanding of mathematics, access higher levels of critical thinking skills, and develop a community of mathematics learners.

The required curriculum includes the following:

- *Math Expressions* for Grades K–5
- *Every Day Counts Calendar Math* for PK–Grade 6

The following supplementary materials are APS-approved and provide comprehensive support to teach mathematics concepts:

- Nimble with Numbers
- Number Sense
- FASTT Math
- Investigations
- Do the Math
- VDOE Mathematics Enhanced Scope and Sequence
- Groundworks
- APS created Supplemental Lessons
- APS Fact Fluency program for Grades 1–2/3–4

At the elementary (K–5) levels, 60 to 75 minutes of mathematics instruction is required each day, and 10 to 15 minutes of that time block is devoted to *Every Day Counts Calendar Math* for

further reinforcement of the Number and Operations and Patterns, Functions and Algebra strands.

All students will leave each grade with a conceptual understanding of basic operations and will be able to relate this understanding to grade-level algorithms.

Assessments and Differentiation

End-of-year APS K–2 data and 3–5 SOL data are used to inform next steps for eliminating the achievement disparities that are evident in AYP results.

PK assessments in math are not yet available. Once beginning and end-of-year PK assessments are available, they will be used to inform instruction in kindergarten.

The following assessment requirements apply to all APS elementary schools:

- By the end of the first week of school, teachers in Grades 1–5 will administer the beginning-of-the-year inventory test.
- The mid-year and end-of-year assessments are required for Grades K–5.
- Teachers in Grades 1–5 are required to administer the Quarter 1 and Quarter 3 assessments.
- Only schools not making AYP for two consecutive years and identified as schools in need of improvement are required to administer the Quarter 1 and Quarter 3 assessments to kindergarten students.

Teachers and site administrators will use ongoing formal and informal assessments to target students in need of additional support in mathematics and provide interventions. Pretest scores will determine students who have mastered specific content objectives so that teachers can design learning activities that will challenge and strengthen their learning in mathematical reasoning. Administrators, coaches, and specialists will provide teachers with ongoing feedback about their instruction in order to facilitate a continual cycle of learning and improving for all teachers.

Middle School Mathematics

Planning and Instruction

The *2009 Standards of Learning Curriculum Framework* is used to plan and guide all math instruction consistently and throughout the school system. Teachers use the 2011–12 APS grade-level pacing guides, which include the newly adopted *Big Ideas* units. Grade-level planning with math coaches is expected, using the framework, pacing guides, and other resources available on the APS Blackboard to promote the teaching of math concepts for understanding. Coaches model effective content-focused teaching strategies and guide teachers through reflective and learning-focused conversations to improve instructional practice. Teachers monitor student progress and use student data to plan differentiated instruction to target the learning needs of diverse learners.

Teachers facilitate math discourse to deepen students' understanding of mathematics, access higher levels of critical thinking skills, and develop a community of mathematics learners.

The standard mathematics curriculum includes:

- Big Ideas in Math 6 and 7
- Algebra 1

The accelerated mathematics curriculum includes:

- Math 7 for 6th graders
- Algebra 1 Intensified
- Geometry Intensified

Support curriculum for mathematics includes:

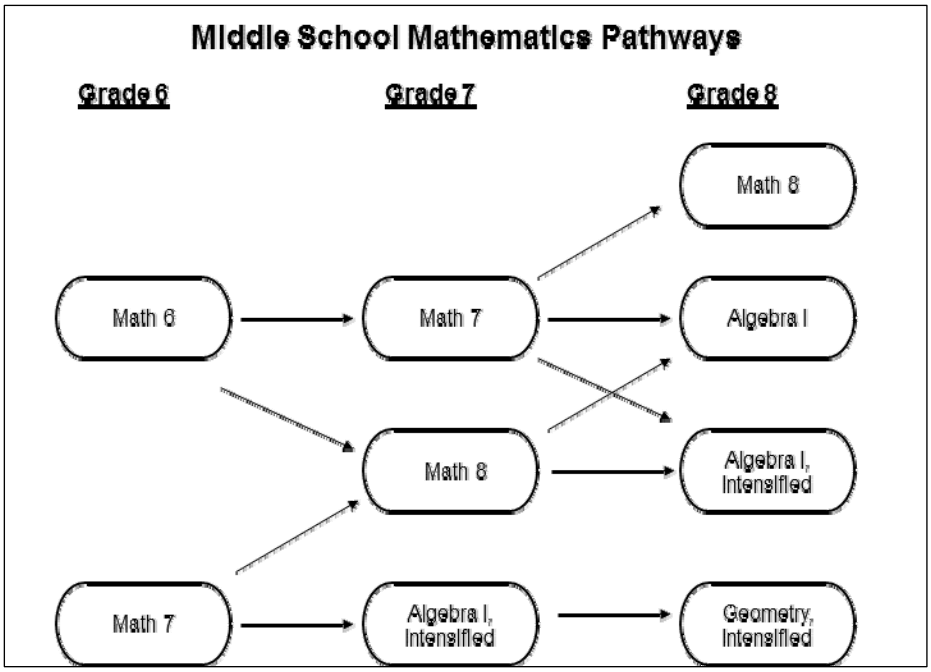
- Math 6 Strategies
- Math 7 Strategies
- Math 8
- HILT Math and HILT Math Strategies

Assessments and Differentiation

A committee of math teachers, central office mathematics staff, school administrators, and counselors review sixth-grade math placement decisions and interpret the composite criteria results on an individual basis. Subsequent course placement recommendations are based on the criteria of course grades and teacher recommendations from prerequisite courses, placement assessments, and SOL assessments. The middle school course pathways shown in Figure 1 are designed to ensure that all students have access to courses on or above grade level, and that students fulfill or exceed state standards for mastery of mathematics courses. The pathways provide multiple entry points for accelerated curriculum, recognizing that all students are unique in their cognitive development. The APS middle school standard pathway reflects the newly adopted SOLs, which progress from Math 6, and Math 7 to Algebra 1 in eighth grade. Accelerated courses are offered at all grade levels beginning with Math 7 to sixth graders, Intensified Algebra to seventh and eighth graders, and Intensified Geometry to eighth graders. Math Strategies courses, offered in Grades 6 and 7 as elective credits, provide support to students in need of additional foundational math instruction.

The HILT Math program is designed to support HILT A and HILT B students who are identified through the APS HILT math assessment to be at least three years below grade level in math education. The HILT math courses are designed to build conceptual understanding of mathematics in conjunction with intensive language support to help students accelerate to the grade- level curriculum. The HILT Math Strategies course, offered as an elective credit, provides support to students in need of additional foundational math and language instruction to build success with the grade- level curriculum.

Figure 1. Middle School Mathematics Pathways



Teachers and site administrators will use ongoing formal and informal assessments to target students in need of additional support in mathematics and to provide interventions. Pretests will determine students who have mastered specific content objectives so that teachers can design learning activities that will challenge and strengthen their learning in mathematical reasoning. Administrators, coaches, specialists, and colleagues will provide teachers with ongoing feedback on their instruction in order to facilitate a continual cycle of learning and improving for all teachers.

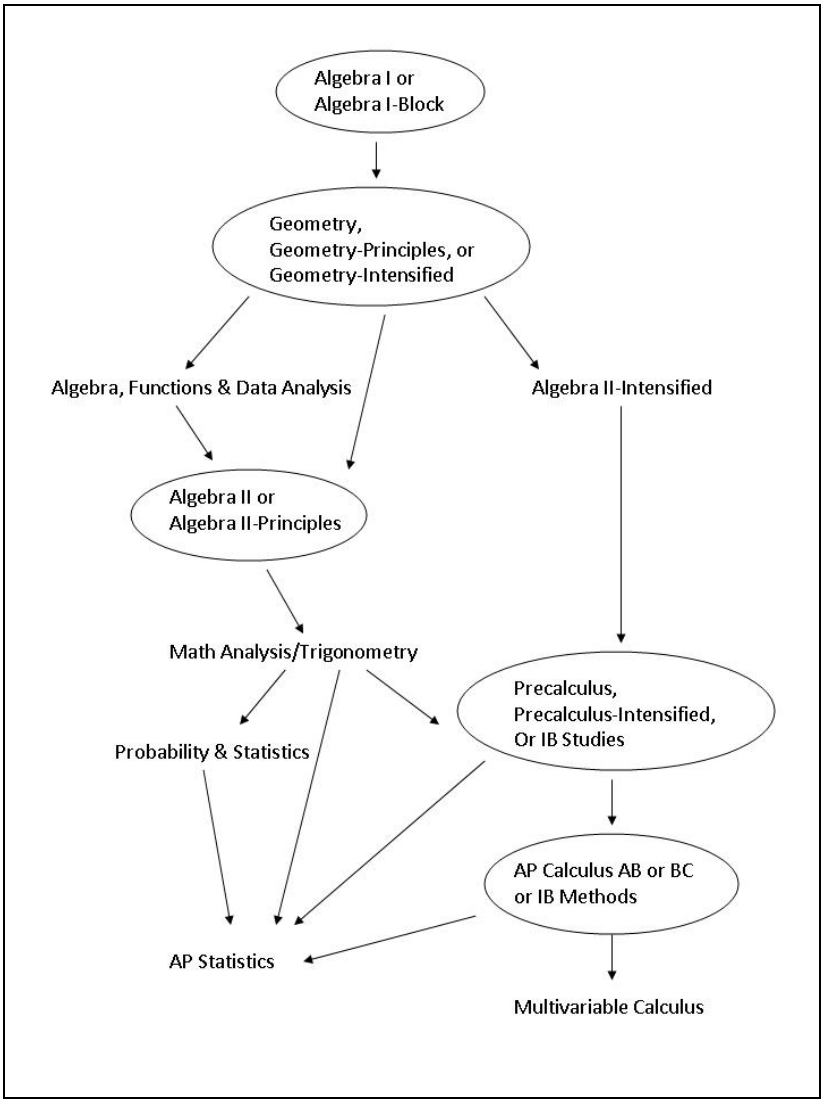
High School Mathematics

Curriculum and Differentiation

The APS high school curriculum maximizes opportunities for students to design a progression of math courses that develops their future endeavors. Course placement recommendations are based on the criteria of course grades and teacher recommendations from prerequisite courses, placement assessments (certain levels), and SOL assessments. The high school mathematics SOL sequences fulfill graduation requirements and open the door to a college education.

With the state's newly adopted Algebra, Functions, and Data Analysis 1 and Capstone courses, students may pursue STEM-related courses aligned to industry standards and rapidly growing areas in the global economy. The advanced mathematics sequences may be tailored towards AP courses in statistics, AB Calculus, BC Calculus, and a dual-credit college course in multivariable calculus. Students enrolled in the IB program at Washington-Lee have the opportunity to pursue IB math standards or advanced levels. The high school course pathways shown in Figure 2 are designed to ensure that all students have access to courses on or above grade level, and that students fulfill or exceed state standards for mastery of mathematics courses.

Figure 2. High School Mathematics Pathway



Planning and Assessment

Teachers work collaboratively to develop common assessments and pacing guides and to support each other with effective and creative ways to use the graphing calculators to facilitate advanced levels of analysis.

Ongoing professional development will focus on teachers supporting one another as they incorporate culturally responsive teaching practices. Teachers will monitor student progress and use student data to plan differentiated instruction to target the learning needs of diverse learners. Teachers will facilitate math discourse to deepen students' understanding of mathematics, access higher levels of critical thinking skills, and develop a community of mathematics learners. Administrators, specialists, and colleagues will provide teachers with ongoing feedback about their instruction in order to facilitate a continual cycle of learning and improvement for all teachers.

What Will Success Look Like?

Through successful implementation, the APS mathematics program should result in the following:

- All students can effectively communicate their conceptual understanding of mathematics.
- All students can make meaningful connections on how mathematics is applied in the real world.
- All students are able to problem solve as a community of learners.
- All students are appropriately challenged in mathematics.
- All students are prepared by Grade 8 to successfully enroll in Algebra I.
- All students are prepared to pursue higher education and a career of their choice.
- Teachers have the content and pedagogical knowledge and support necessary to effectively teach the APS and state curriculum.

Mathematics Program Support and Resources

The Department of Instruction is responsible for providing leadership in the development of curriculum and in the implementation and evaluation of the instructional program, including the required content and skills that students must learn the alignment with national and state standards and legislation, appropriate professional development, international and national studies, and local school and community input. Mathematics staff works with schools on ways to assess student learning, emphasizing a variety of approaches that include objective tests of knowledge and skills as well as more complex measures of students' abilities to apply what they have learned. These efforts allow school staffs to focus more closely on the needs of the individual students. The program supervisor also serves as a liaison to citizen advisory committees, part of the Advisory Council on Instruction (ACI) structure, and works with other citizens and family groups to support the instructional program.

APS curricular programs adopt textbooks on a six-year cycle, which spreads out the total cost for textbooks over time. This money is usually allocated within the Department of Instruction's accounts for the systemwide purchase of textbooks. In fiscal year (FY) 2011, APS used $1.5 million from closeout funds to purchase new mathematics textbooks, ahead of the cycle by one year.

In addition to the materials provided through the Department of Instruction, the APS budgeting process ensures funding equity across schools and programs through the use of planning factors. Schools and programs receive similar levels of support for most resources, with adjustments that reflect student enrollment. The FY 2012 budget includes planning factors for textbooks, which supplement all instructional programs, including math.

School Level	Textbook Planning Factor
Elementary School	$26.80 per student
Middle School	$26.20 per student
High School	$35.70 per student

The budget for the Department of Instruction includes funds for approved curriculum and staff development. These funds are shared among instructional programs. The FY 2012 budget includes $407,000, shared among instructional programs, to pay salaries for curriculum work done by teachers and math coaches. The funds also cover the salaries of in-service professionals, contract courses, and in-service costs for professionals. Mathematics has access to a portion of these funds.

Personnel Resources

The APS Mathematics Office has five staff members, including 1.0 full-time equivalent position (FTE) for a supervisor, an elementary specialist, a secondary specialist, and an administrative assistant, plus a 0.5 FTE ESOL/HILT specialist. For FY 2012, the estimated cost for staffing mathematics is $400,000, which includes an estimated rate of 20 percent for benefits.

Each APS school and program has teachers responsible for mathematics instruction. The cost for classroom teachers is not included in this evaluation. APS employs teachers in accordance with ongoing APS and Virginia Department of Education requirements. Across schools and programs, the teaching staff for FY 2012 includes the following positions to support mathematics.

Elementary Schools:

- More than 400 elementary classroom teachers are responsible for teaching mathematics and other content-area subjects.
- In FY 2012, APS allocated 17.5 elementary math coaches, at an estimated cost of $1,271,113, applying the average teacher salary of $72,635.00.[1] The allocation of math coaches range from 0.5 to 1.5 FTE per school. More math coaching resources are provided at schools designated as in need of improvement.

Middle Schools:

- About 75 teachers are responsible for mathematics instruction across middle schools;
- In FY 2012, APS allocated 5.0 math coaches to support mathematics instruction at an estimated cost of $363,175.00.[2]

[1] Source: The Washington Area Boards of Education (WABE) guide which compares area school districts' salaries, budget, cost per pupil, and class sizes. http://www.apsva.us/cms/lib2/VA01000586/Centricity/Domain/99/FY%202012%20WABE_10-4.pdf

[2] Source: The Washington Area Boards of Education (WABE) guide, which compares area school districts' salaries, budget, cost per pupil, and class sizes. http://www.apsva.us/cms/lib2/VA01000586/Centricity/Domain/99/FY%202012%20WABE_10-4.pdf

High Schools:

- Eighty high school teachers are responsible for mathematics instruction across the high schools.
- No central allocation is provided for high school math coaches. Washington-Lee has allocated its own funds to create a math coach position for the school.

Recommendations From the Previous Evaluation

The first evaluation of the mathematics program was reported in 2005. This section identifies the recommendations made in 2004 and the status of those recommendations today. Some of the issues from 2005 are noted and revisited in the current evaluation report.

This first set of recommendations identifies changes that the program staff could affect independently.

1. Plan professional development activities for elementary, middle, and high school teachers.

   Desired Outcomes:

   - Increased use of best practices for mathematics instruction.
   - Increased attention to teachers' mastery of the mathematical content necessary for deepening student understanding of school mathematics.

   Status: Results on the use of best practices for mathematics instruction and accuracy of mathematical content is examined within this evaluation report.

2. Monitor student achievement data and course enrollment for all students. Specifically monitor all disaggregated data for the subgroups that contribute to AYP benchmarks at all levels.

   Desired Outcome: Increased student achievement in mathematics and elimination of the achievement gap.

   Status: Student outcomes in mathematics are reported annually in the strategic plan and more recently through the monitoring reports to the school board established in the 2010–11 school year. The results are used to target support for schools that have not met the benchmarks for AYP.

3. Work with school-based mathematics leaders at elementary, middle, and high schools to increase their ability to assist teachers so that teachers may more effectively work with students to increase their achievement.

   Desired Outcome: Increased student achievement in mathematics and elimination of the achievement gap.

   Status: This evaluation addresses student achievement and the elimination of achievement gaps.

The next set of recommendations required coordination among the mathematics program m with assistance from schools, and or other instructional programs or departments.

4. Work with school-based administrators to closely monitor the implementation of the mathematics program. This monitoring includes scheduling of mathematics instruction and the evidence of best practices.

   Desired Outcomes:

   - One hour of meaningful mathematics instruction occurs every day for every elementary student.
   - Increased use of best practices contributes to meaningful mathematics instruction for every elementary, middle, and high school student.

   Status: This evaluation addresses the progress made on time for instruction and use of best practices.

5. Work with school-based administrators and Department of Instruction staff to support Teacher Expectation Student Achievement (TESA) training.

   Desired Outcome: Increased use of instructional practices that support student achievement for all are evident in mathematics classes.

   Status: This evaluation addresses the use of culturally responsive teaching practices that are aligned with TESA training.

The final recommendations were dependent upon the School Board allocating additional in the budget.

6. Staff each elementary school with a mathematics instructional resource teacher.

   Desired outcome: Increased in-school instructional support and sustained professional development opportunities provided by a school-based resource teacher.

   Status as of fall 2011: The School Board added funding for at least a half-time (0.5 FTE) math coach at each elementary and middle school. One high school has used its discretionary funds to create a math coach position.

7. Support staffing to expand the Mathematics Acceleration Program.

   Desired outcome: Expanded implementation of the Mathematics Acceleration Program, with adequate professional development support for continued success.

   Status: The Mathematics Acceleration Program was discontinued when the Mathematics Office adopted the *Investigations* textbook series. Professional development-supported implementation of *Investigations* and student outcomes are addressed in this evaluation.

Methodology

Evaluation Design and Questions

The Mathematics Office completed its first evaluation in March 2005. In the current evaluation (Table 1), it revisits a number of recommendations identified in 2005.

Table 1. Mathematics Evaluation Design

Program Service/Objective	Program/Service Question	Data Source(s)
Evaluation Question 1: Implementation—To what degree was the mathematics program implemented?		
Best instructional practices are evident in mathematics instruction.	To what degree are the best practices for teaching evident in daily mathematics instruction?	Observations: • Classroom Assessment Scoring System (CLASS) • Program Checklist
Ensure that all students have access to higher level mathematics courses.	To what extent do students have access to higher level mathematics courses? (Identify challenges faced by student groups)	Course enrollment data Longitudinal study
Evaluation Question 2: Outcomes—What were the outcomes for the targeted population?		
Provide all students the opportunity to be successful at and engaged in deep and meaningful mathematics.	To what degree do all students and all student groups demonstrate rising achievement in mathematics? To what degree do local assessments predict performance on standardized tests and/or early placement in higher level mathematics courses? How does APS's performance on assessments compare with state and national results?	Assessment results Longitudinal study of assessment results Assessment results
Evaluation Question 3: Satisfaction—To what degree are stakeholders satisfied?		
Schools understand and are prepared to support revised Virginia and APS standards, which increase the expectations for students in mathematics.	To what degree do principals believe that they understand the new standards and can ensure that all students leave all elementary schools ready to complete Algebra I successfully in Grade 8?	Principal survey conducted by the Hanover Research Council

Study Measures

Data collection for this evaluation started in the fall of 2010–11. Primary data sources were used to inform this evaluation and are described in detail.

Program Implementation— Observations Using CLASS

In 2010–11, APS adopted the Classroom Assessment Scoring System (CLASS) protocol to observe teacher–student interactions for all program evaluations. CLASS was developed at the University of Virginia's Curry School of Education and provides a common lens and language focused on classroom interactions that encourage student learning.

The CLASS framework is derived from developmental theory and research suggesting that interactions between students and adults are the primary mechanism of child development and learning. Research conducted in more than 6,000 classrooms concludes that in Grades PK–5, students in classrooms with higher CLASS ratings realize greater gains in achievement and social skill development.[3] Research using the CLASS-S (secondary) has shown that teachers' skills in establishing a positive emotional climate, their sensitivity to student needs, and their structuring of their classrooms and lessons in ways that recognize adolescents' needs for a sense of autonomy and control, for an active role in their learning, and for opportunities for peer interaction were all associated with higher relative student gains in achievement.[4]

The CLASS tool organizes teacher–student interactions into three broad domains: emotional support, classroom organization, and instructional support. The upper elementary and secondary tools include an additional domain, student engagement. Within all domains except student engagement, interactions are further organized into multiple dimensions.

The following explanations are for the domains and dimensions for each level.

Emotional Support: Students' social and emotional functioning in the classroom is increasingly recognized as an indicator of school readiness, a potential target for intervention, and even as a student outcome that might be governed by a set of standards similar to those for academic achievement. Research has shown that students who are more motivated and connected to others are much more likely to have more positive social and academic outcomes compared to students without the same levels of motivation and connection. Teachers' abilities to support social and emotional functioning in the classroom are therefore central to ratings of effective classroom practices.

Classroom Organization: The classroom organization domain assesses a broad array of classroom processes related to the organization and management of students' behavior, time, and attention in the classroom. Classrooms function best and provide the most opportunities for

[3] Website http://curry.virginia.edu/uploads/resourceLibrary/CLASS-MTP_PK-12_brief.pdf Center for Advanced Study of Teaching and Learning Charlottesville, Virginia, **Measuring and Improving Teacher-Student Interactions in PK-12 Settings to Enhance Students' Learning.**

[4] Website http://curry.virginia.edu/uploads/resourceLibrary/CLASS-MTP_PK-12_brief.pdf Center for Advanced Study of Teaching and Learning Charlottesville, Virginia, Measuring and Improving Teacher-Student Interactions in PK-12 Settings to Enhance Students' Learning

learning when students are well behaved, consistently have something to do, and are interested and engaged in learning tasks.

Instructional Support: The foundation for the instructional support domain is based on research on children's cognitive and language development. The emphasis is on students' construction of usable knowledge rather than on rote memorization and metacognition—or the awareness and understanding of one's thinking process. As a result, the instructional support domain does not make judgments about curriculum content; rather, it assesses the effectiveness of teachers' interactions with students that support cognitive and language development.

Student Engagement: Unlike other domains, student engagement focuses strictly on student functioning and measures the overall engagement level of students in the classroom.

Table 2 lists the domains and dimensions for each level.

Table 2. CLASS Domains and Dimensions

Domain	Dimensions			
	PK	Lower Elementary	Upper Elementary	Secondary
Emotional Support	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Adolescent Perspectives
Classroom Organization	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats
Instructional Support	Concept Development Quality of Feedback Language Modeling	Concept Development Quality of Feedback Language Modeling	Content Understanding Analysis and Problem Solving Quality of Feedback Instructional Dialogue	Content Understanding Analysis and Problem Solving Quality of Feedback
Student Engagement	n/a	n/a	Student Engagement	Student Engagement

In the fall of 2010, the Office of Planning and Evaluation recruited retired teachers and administrators to become certified CLASS observers. The University of Virginia managed the

certification, which included in-depth training for participants to help them use the tool effectively in the field. In order to show reliability with the CLASS™ tool, observers had to complete an assessment. All observers completed the University of Virginia's certification requirements for conducting CLASS observations.

In October 2010, 212 observations of math were split evenly between elementary and secondary classrooms, with 104 observations across kindergarten through Grade 5 (79 for K–3, 25 for Upper Elementary) and 108 observations across Grades 6 through 12. Based on recommendations from Teachstone[5], each observation was approximately 30 minutes and observers were instructed to view either the beginning or the end of classes. Ten additional minutes were provided for coding the observations. The sample of classrooms observed included all APS schools and programs. The sample included self-contained classrooms that serve ESOL/HILT or students identified with disabilities, as well as mainstream classrooms where ESOL/HILT and students identified with disabilities were included. The sample of self-contained classrooms was equally spread across elementary and secondary observations. Appendix B, CLASS Background and Use by APS, provides more information on the tool and why APS is using it for program evaluations. Appendix D, CLASS Observation Results for Mathematics, provide the details about the 212 observations of mathematics instruction using CLASS.

Program Implementation—Observations Using the Program Checklist

In the 2005 evaluation of mathematics, the program developed an observation tool that looked at mathematics instruction according to APS expectations. In the current evaluation, CLASS provided a more valid and reliable approach to observing mathematics instruction. However, it addressed only about half of the items that were included in the original evaluation tool.

When the program revisited the original observation tool, it identified several areas of mathematics content that were not addressed by CLASS, areas that were also critical to gauging mathematics implementation. As a result, a more abbreviated checklist was developed to observe classroom applications of the mathematics curriculum, resources, and content.

Mathematics supervisors and specialists from other Virginia divisions were invited to participate in the training and two full days of observations canvassing all schools. The participants developed a consistent understanding of the tool, and an end-of-training assessment determined the level of reliability among observers. Survey items that had less than 80 percent agreement were not included in this analysis.

---

[5] Website: http://www.teachstone.org/about-teachstone/ Teachstone's mission is to support teaching and learning through proven, evidence-based education programs, including the Classroom Assessment Scoring System™ (CLASS™) observation tool and related professional development tools. Teachstone was founded in 2008 by two of the CLASS™ tool authors, Bob Pianta and Bridget Hamre. Underlying the Teachstone focus on the CLASS™ observation tool is our commitment to taking research-based supports and making them available and accessible to those working in the field.

In the spring of 2011, 128 observations of mathematics implementation using the content checklist were conducted for mathematics. Observations were also distributed across all APS schools and programs. Observations were slightly skewed towards elementary classrooms (59 percent), with 17 percent in middle school classrooms and 23 percent in high school classrooms, but the sample at each school level was large enough to represent a snapshot of instruction. At each school level, attempts were made to observe self-contained classrooms that serve ESOL/HILT or students with disabilities, as well as mainstream classrooms where ESOL/HILT and students with disabilities were included. Eleven percent of the 107 observations were conducted in self-contained classrooms, two of which served ESOL/HILT students in high schools. The ten observations of self-contained, special education classrooms represented about 8 percent of the elementary and high school observations and 18 percent of the middle school observations. The results from these observations are included in the overall results but are not reported separately because of our concerns with the small sample. Appendix D, Checklist Observation Results from Mathematics, provides details on the 128 observations of mathematics instruction using the program checklist.

Program Implementation—Enrollment Data from APS Student Information System

Planning and Evaluation used preexisting data collected through the APS student information system, eSchool+, to report on enrollment in mathematics classes, to provide data for the longitudinal study by the Hanover Research Council, and to produce student assessment outcomes for this evaluation. Appendix E provides detailed secondary student enrollment in mathematics courses.

Student Outcomes—Standards of Learning

The Commonwealth of Virginia measures achievement through annual SOL tests. Students are expected to take grade-level mathematics assessments from Grades 3 through 8 and end-of course assessments for Algebra I, Geometry, and Algebra II.

SOL assessments are comprised of 35–50 items or questions that measure content knowledge, mathematical processes, reasoning, and critical thinking skills. Student performance is graded on a scale of 0–600, with 400 representing the minimum level of acceptable proficiency and 500 representing advanced proficiency. The Board of Education has defined three levels of student achievement: basic, proficient, and advanced, with basic describing progress towards proficiency. Appendix F provides detailed SOL mathematics results for APS students.

Student Outcomes—Stanford 10

APS uses the Stanford 10 to compare the performance of Arlington students with the performance of students in the same grades across the nation. The content of the Stanford 10 includes academic concepts and skills typically taught in schools throughout the United States.

The Stanford 10 is a standardized, norm-referenced test. A standardized test is one in which the conditions (e.g. time limits, directions) remain the same for each child who takes the test. A norm-referenced test compares a student's results with the results from a national sample of

students in the same grade level taking the test at the same time of year as the student in question. The Stanford 10 test was norm-referenced in 2007, which means that a student who takes the test is being compared to the national sample group who took the test in 2007.

For this evaluation, we focus on percentile ranks, which range from 1 to 99, and average performance falls at 50, in the middle of the range.

Student Outcomes— Hanover Research Council's Longitudinal Study

APS provided the Hanover Research Council (HRC) with all assessment and demographic results included in the longitudinal study. Details about this study are provided in Appendix G, showing Hanover's report.

Student Outcomes—AP and IB

AP and IB courses offer students college-level courses during high school. Colleges vary in how they apply the credit, but generally, students earning scores of 3 or higher on AP exams or scores of 4 or higher on IB exams are given college credit or advanced standing by colleges. Since 2000–01, APS has required that students taking AP classes take the AP exams, and all IB students must take IB exams for courses in which they are enrolled. At the same time, APS assumed all costs for the exams. The information mirrors state reporting on AP and IB exams by looking at the number of high school students achieving qualifying scores on at least one test as a percentage of all students enrolled in AP and IB classes.

Student Outcomes—SAT and ACT Results

The SAT and ACT are designed to assess student readiness for college. Many colleges require the SAT and/or ACT test results part of a student's application, and students across the nation take the tests voluntarily.

This report uses the 2011 summary of math results for the 2011 class of seniors for tests taken through June of their senior year. SAT subject test scores ranged from 200 to 800, and ACT subject test scores ranged from 1 to 36.

Stakeholder Satisfaction—Principal Feedback

In September and October of 2011, the Hanover Research Council administered a survey to elementary and middle school principals who had attended the APS mathematics curriculum retreats. The goal of the survey was to assess the impact and value of these trainings. Accordingly, the survey questionnaire asked principals to rate how strongly they agreed that the retreats had improved their understanding in various areas, were effective in promoting broader communication, and were effective in addressing certain issues. Further, the survey instrument provided space for respondents to explain what they believed were the most and least helpful components of the retreat, as well as offer any additional feedback they thought would be useful.

Hanover Research initiated an e-mail campaign to gather information from all APS elementary and middle schools principals who were present at the retreats. Seventeen of the 20 elementary

school principal attendees completed the survey, indicating a response rate of 85 percent for elementary school principals. Responses were also requested from four middle school principals who had also attended the retreats; only two completed the survey, producing a 50 percent response rate for middle school principals. In the sections that follow, we provide a summary analysis of the survey results. We analyze responses separately for elementary and middle school principals.

Section II: Findings

This section presents the results for the following evaluation questions:

- How well did APS implement mathematics?
- What were the outcomes for the intended recipients?
- How satisfied were the users?

How Well Did APS Implement the Mathematics Program?

To understand the degree to which APS mathematics instruction was implemented as designed, this evaluation looked at implementation of the APS curriculum and best instructional practices through two types of classroom observations. Enrollment data was used to determine the level to which all students and all student groups had access to higher level mathematics courses.

The 2005 evaluation found that mathematics instruction was frequently interrupted at the elementary level. As a result, the program advocated that students participate in one hour of mathematics instruction every day. The present evaluation looked for evidence that would suggest whether instructional time for mathematics was experiencing interruptions similar to those identified in 2005.

Classroom Observations

Systematic observations provide a snapshot of descriptive information about instructional best practices and curriculum alignment occurring in APS classrooms. APS staff can use the results to identify strengths and areas of need and to direct resources towards improving practices that are shown to positively impact student learning.

This evaluation included two types of observations. The Classroom Assessment Scoring System™ (CLASS) measured interactions between teachers and students that should be evident across all APS classrooms. CLASS research shows that effective classroom interactions promote long-term school success across Grades PK–12. The program checklist protocol for observations identified classroom instruction that aligned with the APS mathematics curriculum. Many of the items included on the checklist were observed in the 2005 program evaluation, and where possible, we included comparisons.

Observations Using CLASS

CLASS observations break down the complex classroom environment to help educators focus on boosting the effectiveness of their interactions with learners of all ages. Observations rely on categorizing interactions within the CLASS framework. APS is using CLASS to gauge the

degrees of student-teacher interaction as measured by the tool and to reinforce a common lens and language on classroom interactions that research has shown to boost student learning.

CLASS observation scores range from 1 (minimally characteristic) to 7 (highly characteristic). Overall results across APS mathematics classrooms are reported in Table 3. Based on the observations, K–12 mathematics instruction demonstrated high levels of emotional support (mean = 5.6), classroom organization (mean=5.7), and student engagement (mean=5.5), with scores for each domain averaging in the high end of the middle range, although falling closer to the middle of the range (mean=4.7) for instructional support.

Table 3. Fall 2010 Mathematics Observations Using CLASS: Mean Domain and Dimension Ratings.

Dimension/Domain	Level	APS (N=212)		
		N	Mean	Std. Dev.
Emotional Support	K-12	212	5.6	0.84
Positive Climate	K-12	212	5.5	1.15
Negative Climate	K-12	211	1.3	0.73
Teacher Sensitivity	K-12	211	5.5	1.13
Regard for Student Perspectives	K-5	115	4.5	1.31
Regard for Adolescent Perspectives	6-12	95	4.7	1.11
Classroom Organization	K-12	212	5.7	1.01
Behavior Management	K-12	212	5.9	1.21
Productivity	K-12	212	5.9	1.15
Instructional Learning Formats	K-12	209	5.4	1.10
Instructional Support	K-12	211	4.7	1.26
Content Understanding	4-12	131	5.2	1.32
Analysis and Problem Solving	4-12	130	4.6	1.39
Concept Development	K-3	79	4.1	1.37
Language Modeling	K-3	79	4.1	1.44
Instructional Dialogue	4-5	25	4.0	1.26
Quality of Feedback	K-12	210	4.9	1.34
Student Engagement	4-12	133	5.5	1.16

Note: Negative climate is reversed scored and is equal to a 6.7. In this example, 1.3 is subtracted from 7.0, and 1.0 is added because the observation scale ranges from 1 – 7.

The average observation ratings for all dimensions were 4.0 or higher, which indicates that APS classrooms demonstrated evidence of classroom interactions that are known to boost student learning.

- The highest score for dimensions that were applicable K–12 was for negative climate. The score of 1.3, or reverse score of 6.7, indicates that there were minimal observations of expressed negativity among teachers and students in the classroom.
- The dimensions that make up the instructional support domain had the lowest K–12 mean scores, but because the composition of these scores was different by level, that information will be examined more closely in the analysis by school level.

- Regard for student/adolescent perspectives captures the degree to which the teacher's interactions with students and classroom activities place an emphasis on students' interests, motivations, and points of view and encourage student responsibility and autonomy. As the students get older, it captures the degree to which student ideas and opinions are valued, and content is made useful and relevant for the intended students. Mean scores of 4.5 and 4.7 are low compared with the other dimensions identified in the domain of emotional support. It is important to note that regard for student/adolescent perspectives is a critical element for culturally responsive instruction and differentiating instruction to meet students' instructional needs.

Across school levels, different patterns of observable characteristics emerge. School level results across APS mathematics classrooms are reported in Figure 3 and Table 4.

Figure 3. Fall 2010 Mathematics Observations Using CLASS: Domain Ratings by School Level

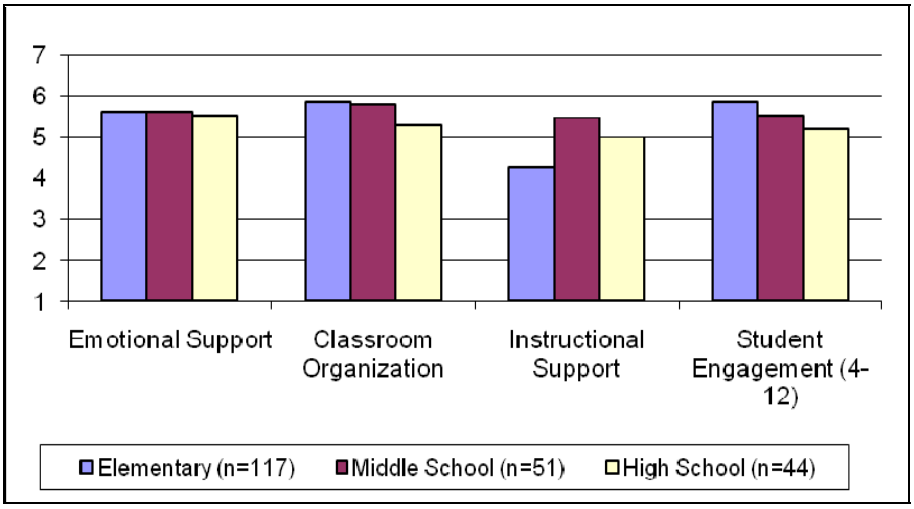


Table 4. Fall 2010 Mathematics Observations Using CLASS: Mean Domain and Dimension Ratings by School Level

Dimension/Domain	Level	E.S. (N=117)			M.S. (N=51)			H.S. (N=44)		
		N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Emotional Support	K-12	117	5.6	0.87	51	5.6	0.81	44	5.5	0.82
Positive Climate	K-12	117	5.5	1.22	51	5.6	0.98	44	5.5	1.15
Negative Climate	K-12	117	1.3	0.76	51	1.5	0.81	43	1.3	0.49
Teacher Sensitivity	K-12	117	5.6	1.13	51	5.7	1.10	43	5.1	1.11
Regard for Student Perspectives	K-5	115	4.5	1.31	n/a			n/a		
Regard for Adolescent Perspectives	6-12	n/a			51	4.7	0.99	44	4.7	1.25
Classroom Organization	K-12	117	5.8	0.93	51	5.8	0.99	44	5.3	1.16
Behavior Management	K-12	117	6.1	1.11	51	5.8	1.19	44	5.3	1.32
Productivity	K-12	117	6.0	1.11	51	5.9	1.06	44	5.5	1.30
Instructional Learning Formats	K-12	114	5.4	1.09	51	5.6	1.02	44	5.0	1.17
Instructional Support	K-12	116	4.3	1.19	51	5.5	1.03	44	5.0	1.18
Content Understanding	4-12	36	4.6	1.38	51	5.6	1.20	44	5.3	1.23
Analysis and Problem Solving	4-12	36	4.1	1.33	51	5.1	1.15	43	4.6	1.50
Concept Development	K-3	79	4.1	1.37	n/a			n/a		
Language Modeling	K-3	79	4.1	1.44	n/a			n/a		
Instructional Dialogue	4-5	25	4.0	1.26	n/a			n/a		
Quality of Feedback	K-12	116	4.5	1.30	51	5.7	1.12	43	5.2	1.25
Student Engagement	4-12	37	5.8	0.93	51	5.5	1.08	44	5.2	1.34

Elementary School Observations

At this level, observation results show the greatest variation across the four domains scores, with a 5.8 (mid-high) mean rating for classroom organization and a 4.3 (mid) mean rating for instructional support.

- The mean dimension scores for behavior management (6.1) and productivity (6.0) fell in the high range.
- The average scores for instructional support clustered in the mid range, but there was a greater level of variation across the observations of classrooms, compared to scores for the other domains.
- The lowest rated dimension was instructional dialogue (applied to Grades 4 and 5), which captured the purposeful use of structured, cumulative questioning and discussion that guide and prompt students and facilitates students' understanding of content and language development.
- The widest variation in scores was given to the K–3 dimension for language modeling, which assessed the quality and amount of the teacher's use of language–stimulation and language–facilitation techniques.

Middle School Observations

Across the three school levels, middle school observations demonstrated the strongest evidence of classroom interactions. At the same time, the standard deviation around the mean ratings for

the domains and dimensions was smallest at this level, suggesting that student–teacher interactions in middle school math are fairly consistent. Results across all but three dimensions fell into the mid-high range. Some notable findings across the middle school observations include the following:

- Negative climate (1.5 or reverse score = 6.5), which indicates low levels of expressed negativity among teachers and students in the classroom. It is notable that the average observed level for negative climate was slightly more negative (0.2 points) at middle school than the rating for both elementary and high school observations (1.3). Positive climate was rated mid-high at 5.5.
- Analysis and problem solving (5.1) was highest at middle school. This dimension represents the degree to which the teacher facilitates students' use of higher-level thinking skills, such as analysis, problem solving, reasoning, and creation through the application of knowledge and skills, as well as opportunities for demonstrating metacognition (i.e. thinking about thinking).
- Regard for adolescent perspective (4.7) was similar to the ratings observed across school levels, but there was less variation in the middle school ratings. This dimension rates how well the interactions capitalize on the social and developmental needs and goals of adolescents by providing opportunities for student autonomy and leadership. Also considered is the extent to which student ideas and opinions are valued and content is made useful and relevant to adolescents.
- Middle school observations of content understanding were in the mid-high range (5.6), which indicates that mathematics lesson content and the approaches used helped students comprehend the framework, key ideas, and procedures. At the highest level (6.0 or higher), these interactions between the teacher and students would lead to an integrated understanding of facts, skills, concepts, and principles of mathematics.

High School Observations

Observations at the high school level fell into the mid-range, with scores ranging from 4.6 to. 5.5. For six of the dimension scores, the standard deviation was greater than 1.2 points, suggesting great variation in the observed student–teacher interactions. Across the observations, some highlights for high school include the following:

- The lack of evidence for negative climate (1.3 or reverse score of 6.7), as well as a mid-range positive climate (5.5).
- The lowest mean scores were observed in the dimensions of regard for adolescent perspective (4.7), and analysis and problem solving (4.6).
    - Regard for adolescent perspective is the extent to which the teacher is able to meet and capitalize on the social and developmental needs and goals of students by providing opportunities for student autonomy and leadership. This area improved when student ideas and opinions were clearly valued and content was made useful and relevant to students in the classroom.
    - Analysis and problem solving assesses the degree to which the teacher facilitates students' use of higher-level thinking skills, such as analysis, problem solving, reasoning,

and creation through the application of knowledge and skills. Opportunities for demonstrating metacognition—i.e. thinking about thinking—are also included.

- One of the biggest surprises was that although there was evidence of classroom organization at the mid-high level, high schools had the lowest average ratings for behavior management (5.3), productivity (5.5) and instructional learning formats (5.0).

Observations Across Levels

The following items look at the results across all school levels:

- Instructional support was rated lowest at elementary schools, lower than middle or high school ratings (4.3, 5.5, and 5.0). This score is the lowest score for any domain, any level, and this difference is the largest one between levels on any domain.
- Emotional support is equal among all levels and relatively high (5.6, 5.6, and 5.5).
- Classroom organization is lowest for high school (5.8, 5.8, and 5.3).
- Student engagement decreases with level, with elementary highest and high school lowest (5.8, 5.5, and 5.2).

Observations of Differentiation

One of the advantages of using CLASS is the ability to link system-wide priorities to defined student–teacher interactions. With regular collection and monitoring of classroom practices, across programs and over time, we expect to provide stronger central support for improving practices. Within CLASS, APS has identified several composite measures that related to differentiation and culturally responsive teaching.

DI involves providing students with different avenues to acquiring content; to processing, constructing, or making sense of ideas; and to teaching materials, so that all students within a classroom can learn effectively, regardless of differences in ability. The CLASS dimensions that relate to differentiation include the following:

- Teacher sensitivity (PK through secondary(grades 6-12))
- Regard for student perspective (PK and elementary)
- Regard for adolescent perspective (secondary)
- Instructional learning formats (PK through secondary)
- Concept development (PK and elementary)
- Analysis and problem solving (secondary)

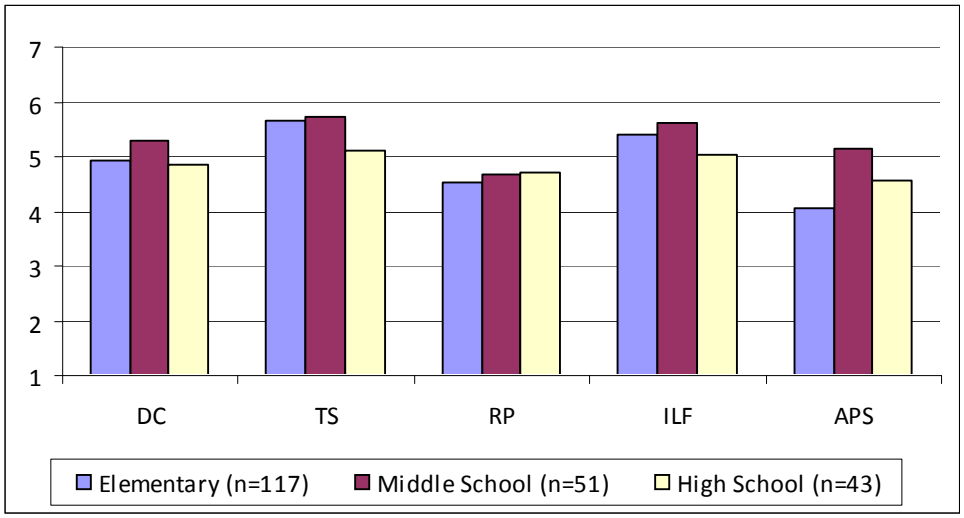
Table 5 and Figure 4 show the observable dimensions that align with differentiation, and across all school levels, the ratings exceed the mid-range rating of 4.0. Ratings were strongest for teacher sensitivity and lowest for regard for student/adolescent perspective. By level, the lowest scores were given to concept development (at K–3), analysis and problem solving (4–5, 9–12), and regard for adolescent perspective (6–8). This information suggests that a foundation for

student–teacher interactions that supports differentiated learning exists, although identifying areas for improvement vary by instructional level.

Table 5. Fall 2010 Mathematics Observations of Differentiation Using CLASS: Mean Domain and Dimension Ratings by School Level

Differentiation Composite	APS Total			E.S.			M.S.			H.S.		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
Differentiation Composite	212	4.99	0.96	117	4.92	0.95	51	5.29	0.81	44	4.85	1.08
Teacher Sensitivity	211	5.55	1.13	117	5.64	1.13	51	5.73	1.10	43	5.09	1.11
Regard for Student Perspectives (K-5)	115	4.54	1.31	115	4.54	1.31	n/a			n/a		
Regard for Adolescent Perspectives (6-12)	95	4.68	1.11	n/a			51	4.67	0.99	44	4.70	1.25
Instructional Learning Formats	209	5.37	1.10	114	5.39	1.09	51	5.63	1.02	44	5.02	1.17
Concept Development (K-3)	79	4.05	1.37	79	4.05	1.37	n/a			n/a		
Analysis and Problem Solving (4-12)	130	4.65	1.39	36	4.06	1.33	51	5.14	1.15	43	4.56	1.50

Figure 4. Fall 2010 Mathematics Observations of Differentiation Using CLASS: Domain Ratings by School Level



Note: Chart does not include Concept Development, since that is only an elementary dimension

DC = Differentiation Composite

TS = Teacher Sensitivity

RP = Regard for (Student/Adolescent) Perspectives

ILF = Instructional Learning Formats

APS = Analysis and Problem Solving

Observations of Culturally Responsive Interactions

Culturally responsive teaching interactions develop intellectual, social, emotional, and political learning by "using cultural referents to impart knowledge, skills, and attitudes"[6] CLASS dimensions that relate to culturally responsive teaching include the following:

- Positive climate (PK through secondary)
- Negative climate (PK through secondary)
- Teacher sensitivity (PK through secondary)
- Regard for student perspective (PK and elementary)
- Regard for adolescent perspective (secondary)
- Behavior management (PK and elementary)
- Instructional learning formats (PK and elementary)
- Content understanding (secondary)
- Analysis and problem solving (secondary)
- Quality of feedback (PK through secondary)
- Student engagement (secondary)

The 2010 observations using CLASS indicate that overall, APS mathematics instruction demonstrated a solid foundation in the mid-high range (5.46) on dimensions that are critical for culturally responsive instruction (Table 6 and Figure 5). Results were fairly consistent regardless of the school level observed. However, an examination of the dimension ratings that fit into the composite also point to some areas for improvement.

Across all levels of mathematics, more attention needs to be given to regard for adolescent/student perspective. For younger students, instruction needs to connect more overtly to students' interests, motivations, and points of view and encourage student responsibility and autonomy. For older students, APS needs to build in more opportunities that incorporate student ideas and opinions, so the content is made useful and relevant.

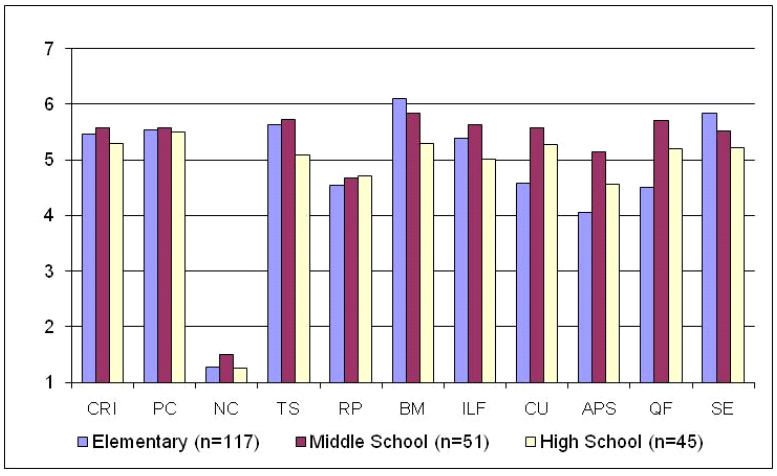
[6] Ladson-Billings, B. (1992). Reading between the lines and beyond the pages: A culturally relevant approach to literacy teaching. Theory Into Practice, 31(4), 312-320.

Table 6. Fall 2010 Mathematics Observations of Culturally Responsive Interactions Using CLASS: Mean Domain and Dimension Ratings by School Level

	APS Total			E.S.			M.S.			H.S.		
Culturally Responsive Instruction	**N**	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**
Culturally Responsive Instruction	213	5.46	0.87	117	5.46	0.84	51	5.59	0.84	45	5.30	0.97
Positive Climate	212	5.54	1.15	117	5.54	1.22	51	5.57	0.98	44	5.50	1.15
Negative Climate	211	1.33	0.73	117	1.27	0.76	51	1.51	0.81	43	1.26	0.49
Teacher Sensitivity	211	5.55	1.13	117	5.64	1.13	51	5.73	1.10	43	5.09	1.11
Regard for Student Perspectives (K-5)	115	4.54	1.31	115	4.54	1.31	n/a			n/a		
Regard for Adolescent Perspectives (6-12)	95	4.68	1.11	n/a			51	4.67	0.99	44	4.70	1.25
Behavior Management	212	5.88	1.21	117	6.11	1.11	51	5.84	1.19	44	5.30	1.32
Instructional Learning Formats	209	5.37	1.10	114	5.39	1.09	51	5.63	1.02	44	5.02	1.17
Content Understanding (4-12)	131	5.20	1.32	36	4.58	1.38	51	5.57	1.20	44	5.27	1.23
Analysis and Problem Solving (4-12)	130	4.65	1.39	36	4.06	1.33	51	5.14	1.15	43	4.56	1.50
Quality of Feedback	210	4.94	1.34	116	4.51	1.30	51	5.71	1.12	43	5.21	1.25
Student Engagement (4-12)	133	5.51	1.16	37	5.84	0.93	51	5.53	1.08	45	5.21	1.34

Analysis and problem solving is another area where mathematics should focus to benefit all students. Although the average rating for each group fell above the mid level (4.0), the variation across the observed classrooms suggests an uneven use of higher-level thinking skills, such as analysis, problem solving, reasoning, and creation through the application of knowledge and skills.

Figure 5. Fall 2010 Mathematics Observations of Differentiation Using CLASS: Domain Ratings by School Level.



Note:
CRI = Culturally Responsive Instruction
PC = Positive Climate
NC = Negative Climate
TS = Teacher Sensitivity
RP = Regard for Student Perspectives (K-5), Regard for Adolescent Perspectives (6-12)
BM = Behavior Management
ILT = Instructional Learning Formats
CU = Content Understanding (4-12)
APS = Analysis and Problem Solving (4-12)
QF = Quality of Feedback (all grades)
SE = Student Engagement (4-12)

Observations Using the Mathematics Checklist

Although CLASS focuses on student-teacher interactions, it does not examine content instruction for mathematics. Observations of mathematics using the content checklist looked at key concerns expressed by the program in 2005 and again in 2011.[7]

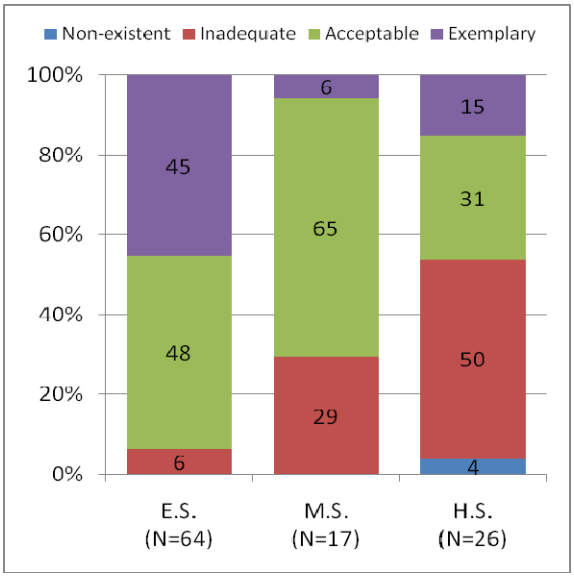
New Learning

Students connect what they learn to what they already know, interpreting incoming information, and even sensory perception, through the lens of their existing knowledge, beliefs, and assumptions.

Observers rated the level of mathematics learning that was connected to previous learning. Figure 6 shows the results by school level. Ratings were based on a four-point scale, with 1 indicating that there was no evidence of the connection and 4 indicating that the evidence was exemplary.

Evidence of acceptable or exemplary connections of new learning to previous learning that was rated acceptable or exemplary decreased as the school levels increased.

Figure 6. Spring 2011, Mathematics Checklist Observations: New Learning Was Connected to Previous Learning



Overall, evidence of acceptable or exemplary connection was seen on average as follows:

- Nine out of 10 times across elementary mathematics classrooms, up from an average of 7 in 10 classrooms observed in 2005.
- Seven out of 10 times across middle school mathematics classrooms, about the same as the levels observed in 2005.
- Approximately 4.5 out of 10 times across high school mathematics classrooms, down from a high of approximately 3 out of 4 classrooms observed in 2005.

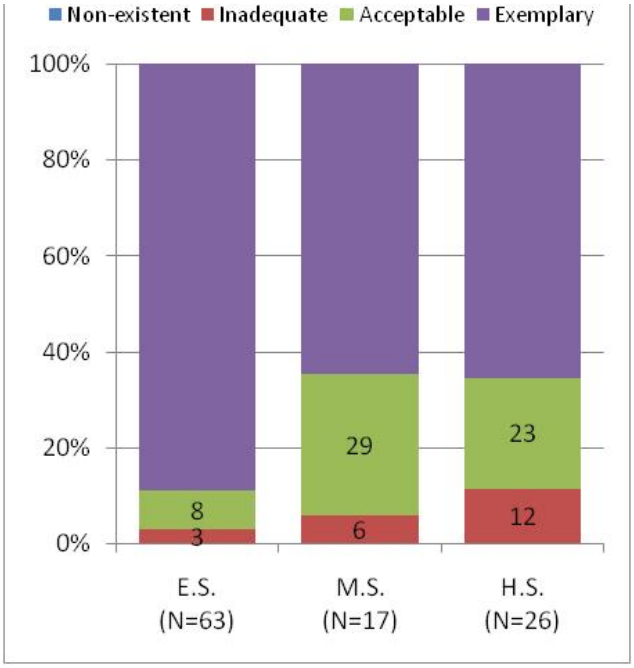
Accuracy of Mathematics Content

The principle for teaching, defined by the National Council of Teachers of Mathematics, states that effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well. This principle clearly articulates that teachers need to know and understand deeply the mathematics they are teaching and be able to

[7] The 2005 Mathematics Evaluation reports results on observed behaviors includes missing results among the reporting categories. The 2011 report excludes missing results. To allow for valid comparisons between 2005 and 2011 observations, results from the 2005 report were re-coded to exclude missing observation results.

draw on that knowledge with flexibility in their teaching tasks.[8]

Figure 7. Spring 2011, Mathematics Checklist Observations: Mathematical Content Presented Was Accurate



The 2005 and 2011 (Figure 7) evaluation looked at the accuracy of the mathematical content that was observed.

- Ninety-seven percent of the elementary school observations demonstrated accurate content, up from 92 percent in 2005.
- Ninety-four percent of the middle school observations demonstrated accurate content, up from 70 percent in 2005.
- Eighty-eight percent of the high school observations demonstrated accurate content, down from 94 percent in 2005.

Precise and Accurate Mathematical Language

The 2005 evaluation found that approximately one third of the classrooms observed did not use age-appropriate, mathematical language and vocabulary. This finding was consistent across elementary, middle, and high school observations.

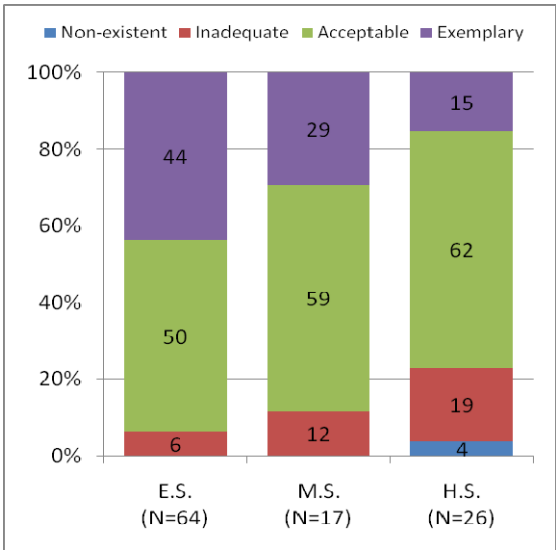
Since that time, the mathematics program has focused on using age-appropriate language and vocabulary with mathematics teachers.

[8] Principles and Standards National Council of Teachers of Mathematics, 1906 Association Drive, Reston, VA 20191-1502

Observations conducted in spring of 2011(Figure 8) show dramatic improvement, with acceptable or exemplary ratings increasing at all grade levels, as follows:

- Approximately 94 percent across the elementary school observations
- Approximately 88 percent across the middle school observations
- Approximately 77 percent across the high school observations.

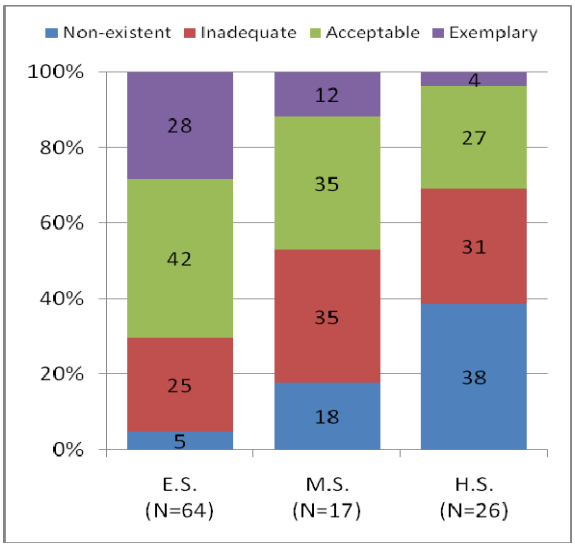
Figure 8. Spring 2011, Mathematics Checklist Observations: Precise and Accurate Mathematical Language and Vocabulary Appropriate to the Grade Level Were Included in the Lesson



Discourse About Mathematical Concepts

Mathematical classroom discourse is about whole-class discussions in which students talk about mathematics in such a way that they reveal their understanding of concepts. Students also learn to engage in mathematical reasoning and debate. Discourse can be used to determine what students are thinking and understanding in order to build bridges between what they already know and what there is to learn; and it can offer opportunities to develop agreed-upon mathematical meanings or definitions and explore conjectures.

Figure 9. Spring 2011, Mathematics Checklist Observations: Students Were Engaged in Discourse About Mathematical Concepts



Discourse was observed in 2005 and revisited again in 2011. The observations of students engaged in discourse about mathematical concepts show mixed results compared with six years ago. In 2011 (Figure 9), acceptable and exemplary use of discourse was evident as follows:

- About 70 percent of the elementary school observations, up from 52 percent in 2005.
- Almost half of the middle school observations, down from 64 percent in 2005.
- About a third of the high school observations, down from three quarters of the observations conducted in 2005.

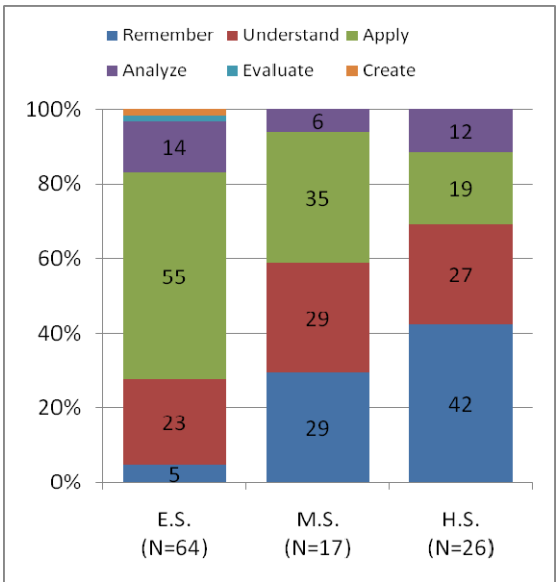
Cognitive Complexity

In 2011 (Figure 10), mathematics added a new item that asked observers to rate the cognitive complexity of the task or assignment on a scale from 1 to 6, with 1 interpreted as "remember" and 6 interpreted as "create."

For this measure, the results for apply, analyze, evaluate, and create are combined to show evidence beyond understanding. Across the observations are the following:

- About 73 percent of the elementary classrooms demonstrated an activity at the level of application or higher.
- About 41 percent of the middle school classrooms demonstrated an activity at the level of application or higher.
- About 31 percent of the high school classrooms demonstrated an activity at the level of application or higher

Figure 10. Spring 2011, Mathematics Checklist Observations: What was the cognitive complexity of the task or assignment?



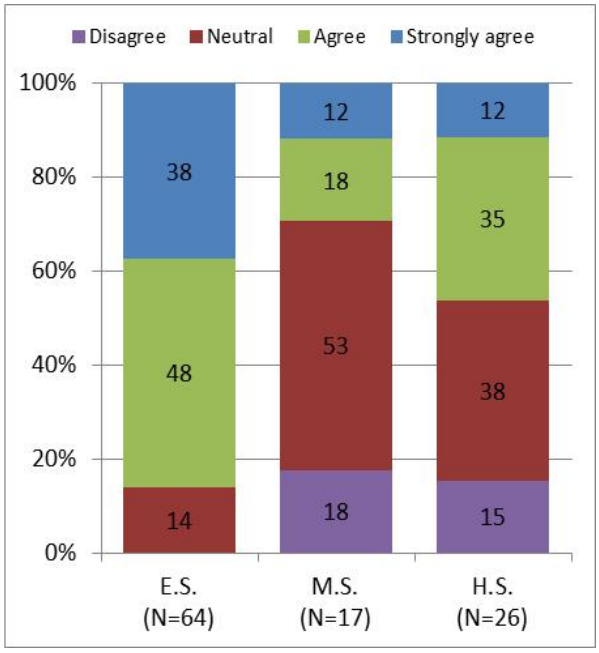
Effectiveness of Lesson

In 2005, in approximately six in 10 of the classrooms observed across all levels, the lessons were rated as effective in further deepening the students' understanding of mathematics.

The observations conducted in spring 2011 (Figure 11) showed more variation. The lessons were rated effective in further deepening the students' understanding of mathematics as follows:

- About 86 percent of elementary school observations
- About 30 percent of the middle school observations
- About 47 percent of the high school observations

Figure 11. Spring 2011, Mathematics Checklist Observations: The lesson Was Effective in Further Deepening the Students' Understanding of Mathematics



Interruptions to Mathematics Instruction

The 2005 evaluation found that mathematics instruction was frequently interrupted. In 2005, 118 observations were attempted, and 86 or about three quarters were completed. Among the 118 classrooms that were not observed, two out of every three were working on something other than mathematics.

The elementary schedules that schools submitted for the 2010–11 observations clearly identified that almost all classrooms provided at least one hour of math instruction per day. These schedules were used for both the fall observations using CLASS and the spring observations using the mathematics checklist.

In contrast to 2005, observers conducting CLASS observations in the fall and Checklist observations in the spring reported few interruptions to their attempted observations. Students were participating in mathematics instruction as identified on the school's schedule without disruption from other activities.

Discussion of Observations

There are some contradictions between the results from CLASS and the checklist observations. Specifically, instructional support (CLASS) was lowest for the elementary level among all the school levels, but the elementary level was the strongest group on many checklist items that were

directly related to instruction. Some possible reasons for this contrasting information were the following:

- The two observations occurred at two different times of the year. CLASS observations were completed in October, and the checklist observations occurred in March.
- CLASS observations focused on student–teacher interactions, and, within the instructional domain, it was possible to give high ratings without confirming the accuracy of the content.
- CLASS observations looked for the level of interactions engaging all students across the observation, and the checklist observations rated if behavior occurred and whether behavior was adequate, inadequate, or exemplary. Less frequent occurrences of the behavior on the checklist might be rated accurate but would not be sufficient for a mid-level rating on CLASS.

Enrollment

One of the goals for mathematics is for each student to complete Algebra I successfully by Grade 8. To measure progress towards this goal and to assess the extent to which students have access to higher level mathematics courses, this evaluation includes two different analyses of enrollment in mathematics courses, as follows:

- Course enrollment patterns for the last five years
- A longitudinal study of student enrollment over time

All mathematics courses are designed to be rigorous. Some variation among the course offerings provides instruction that is appropriate for the needs of different types of learners. Throughout this section on enrollment, secondary courses are categorized according to the definitions presented in Table 7.

Table 7. Description of Course Type Categories

Course Type Category	Course Type Description
Grade Level	Grade-level courses are the expected level of study for students, and the work aligns with the grade-level SOLs.
Accelerated	Acceleration is defined by participating in above grade-level course work (i.e. Algebra I, Geometry in middle school) and courses “advanced” or “intensified,” which indicate the content is accelerated.
Special Education (SPED)	For this analysis, SPED identifies student participation in self-contained special education mathematics instruction, based on IEPs.
HILT	For this analysis, high intensity language training (HILT) identifies students who participate in self-contained courses designed for students with limited English proficiency from beginning levels through advanced levels (HILTEX) until they are ready to enter mainstream classes.
Remedial	Below grade level, deficiency being addressed.
Extra Support	Additional instruction being offered in conjunction with another class (e.g. Algebra Prep) or slower paced instruction (e.g. Algebra I Pt I/II).

Table 8 shows the mathematics courses by the course type used in our following study of course enrollment. During the five years included in the analysis of course enrollment, APS has added some mathematics courses and discontinued others to adjust to the needs of students.

Table 8. Secondary Mathematics Courses Types

Course Type	Middle School	High School
Standard	• Math 6 • Math 7 • Math 8	• Algebra I • Algebra II • Geometry • Math Analysis - Trigonometry • Probability and Statistics • Precalculus
Accelerated	• Math 6 Intensified • Math 7 Intensified • Math 7, taken in Grade 6 • Math 8, taken in Grade 6 or 7 • Algebra I • Algebra I Intensified • Geometry—*HB-Woodlawn only, added in 2007-08* • Geometry Intensified	• Geometry, taken in Grade 9 • Geometry Intensified • Algebra II, taken in Grade 10 • Algebra II Intensified • Precalculus Intensified • IB Math Studies • IB Math Methods Precalculus • IB Math Methods Calculus • AP Statistics • AP Calculus AB • AP Calculus BC
SPED	• Math • Math 6 • Math 7 • Math 8	• Math • Math 11 • Math 12 • Algebra I Part I • Selected Topics in Geometry
HILT	• HILT Math Level 1 • HILT Math Level 2 – *discontinued after 2006-07*	• Accelerated Literacy Math • HILT Math Level 1 • HILT Math Level 2 • General Math I
Remedial	• Math 6, taken in a higher grade • Math 7, taken in a higher grade	• HS General Math • Math 8, taken in high school
Extra Support	• Math Skills/Math Power • Algebra Prep	• Algebra Prep • Algebra I Part I • Algebra I Part II • Algebra, Functions & Data Analysis, *added in 2009-10* • RISE Algebra • Algebra II Principles • Geometry Principles • RISE Geometry

APS does not currently have standard reports that allow for the monitoring of student enrollment. The data presented on enrollment was produced by Planning and Evaluation for this evaluation.

Secondary Enrollment Patterns from 2006–07 through 2010–11

Appendix E shows enrollment data from 2006–07 through 2010–11 as reported by various demographic and categorical breakdowns. For this section of the evaluation, APS looked at enrollment overall, by race and then took a closer look at trends across all students in the patterns identified by HRC's longitudinal study (Appendix G).

Every middle school student is required to take mathematics each year. High school students are not required to take mathematics every year; rather, high school students are required to complete three credits of math for standard diplomas and four credits for advanced diplomas. Students who accelerate their mathematics instruction during middle school enter high school having earned high school credit towards graduation requirements (Algebra I, Geometry I, and so forth). Because of these differences, the results for middle and high school are presented separately.

Table 9 shows that APS middle school mathematics course enrollment increased by 17 percent from 3,671 students in 2006–07 to more than 4,300 students in 2010–11. During this time, the proportion of middle school students receiving grade-level mathematics instruction increased, as did participation in courses identified as extra support. The increase is offset by decreases in the proportion of students participating in accelerated courses and self-contained courses (special education and HILT).

Table 9. Middle School Mathematics Enrollment by Course Type, 2006–07 through 2010–11

Course Type	2006–07		2007–08		2008–09		2009–10		2010–11	
	N	%	N	%	N	%	N	%	N	%
Total	3671	100	3870	100	3915	100	4037	100	4316	100
Grade Level	1384	38	1666	43	1818	46	2015	50	2122	49
Accelerated	1751	48	1698	44	1563	40	1541	38	1629	38
SPED	381	10	337	9	328	8	277	7	253	6
HILT	129	4	111	3	96	2	128	3	105	2
Remedial	0	0	1	0	4	0	1	0	1	0
Extra Support	26	1	57	1	106	3	75	2	206	5

Since acceleration has been a major focus, it is helpful to further look at overall middle school enrollment by course types and by grade level's). Across all three grades, there were the following results:

- An increase in the proportion of students taking grade level math courses.
- A decrease in the proportion of students enrolled in self-contained SPED or HILT mathematics classes.
- A decrease in the proportion of students enrolled in accelerated courses.

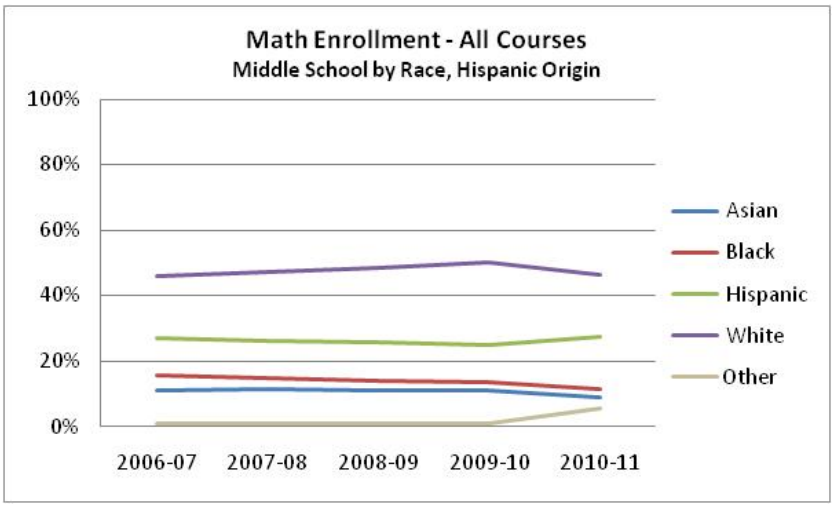
Table 10. Middle School Mathematics Enrollment by Course Type and Grade Level, 2006–07 through 2010-11

Grade	Course Type	2006–07		2007–08		2008–09		2009–10		2010–11	
		N	%	N	%	N	%	N	%	N	%
06	Total	1203	100	1290	100	1341	100	1325	100	1494	100
	Grade Level	576	48	698	54	777	58	805	61	885	59
	Accelerated	445	37	425	33	387	29	359	27	397	27
	SPED	117	10	104	8	116	9	94	7	94	6
	HILT	55	5	43	3	33	2	51	4	48	3
	Extra Support	10	1	20	2	28	2	16	1	70	5
07	Total	1260	100	1262	100	1340	100	1409	100	1405	100
	Grade Level	449	36	528	42	605	45	729	52	706	50
	Accelerated	618	49	552	44	514	38	509	36	494	35
	SPED	133	11	109	9	117	9	91	6	79	6
	HILT	44	3	39	3	41	3	38	3	31	2
	Extra Support	16	1	34	3	63	5	42	3	95	7
08	Total	1206	100	1318	100	1234	100	1303	100	1417	100
	Grade Level	358	30	440	33	436	35	481	37	531	37
	Accelerated	689	57	721	55	662	54	673	52	738	52
	SPED	131	11	124	9	95	8	92	7	80	6
	HILT	28	2	29	2	22	2	39	3	26	2
	Remedial	0	0	1	0	4	0	1	0	1	0
	Extra Support	0	0	3	0	15	1	17	1	41	3

Enrollment by Race, Hispanic Origin

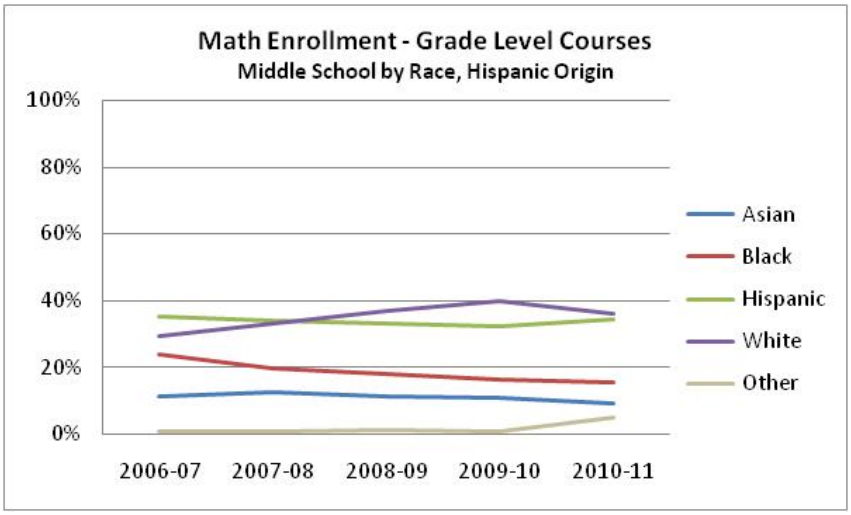
Similar to the enrollment addressed in the 2005 evaluation, middle school enrollment data indicates a continued disproportion in the diversity of the students in taking accelerated courses.

Figure 12. Middle School Mathematics Enrollment by Race, Hispanic Origin, 2006-07 to 2010-11.



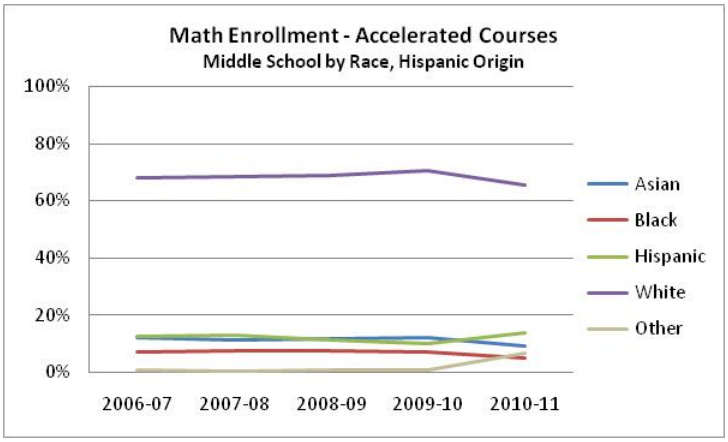
Middle school students are required to take mathematics each year. The proportion of students enrolled in middle school mathematics courses reflects the diversity of the APS student body (Figure 12).

Figure 13. Middle School Mathematics Enrollment in Grade Level Courses by Race, Hispanic Origin, 2006-07 to 2010-11.



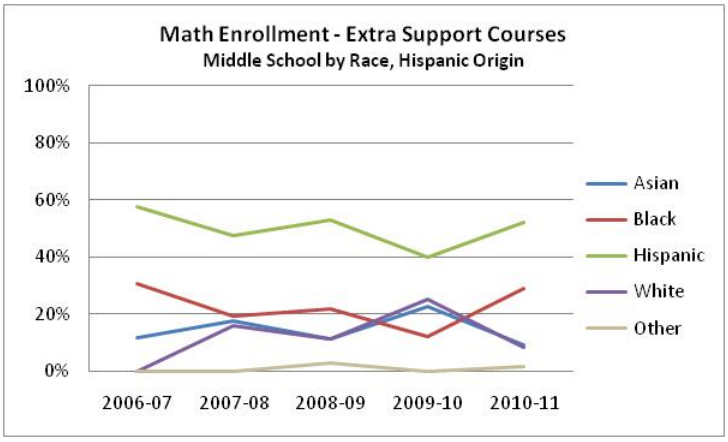
Middle school grade-level mathematics courses show enrollment levels similar to the race or Hispanic origin of most groups. The exceptions are white students who are disproportionately underenrolled and black students who were disproportionately overenrolled in 2006–07, but these groups now mirror middle school enrollment (Figure 13).

Figure 14. Middle School Mathematics Enrollment in Accelerated Courses by Race, Hispanic Origin, 2006-07 to 2010-11.



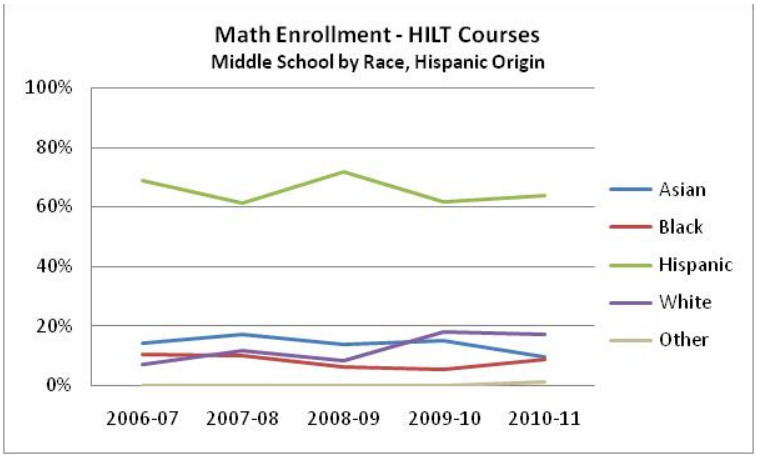
Enrollment in accelerated middle school courses is less diverse, with the majority of students represented in these courses identified as white (Figure 14).

Figure 15. Middle School Mathematics Enrollment in Extra Support Courses by Race, Hispanic Origin, 2006-07 to 2010-11



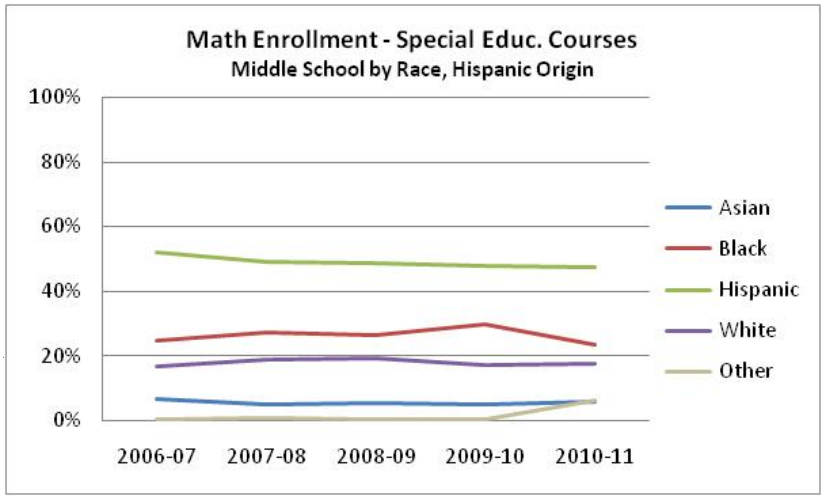
Enrollment in courses that provide extra support increased from 26 students to more than 200 students from 2006–07 to 2010–11. Enrollment patterns show some variability although showing disproportions in the overrepresentation of Hispanic and black students, and underrepresentation of white students (Figure 15).

Figure 16. Middle School Mathematics Enrollment in HILT Courses by Race, Hispanic Origin, 2006-07 to 2010-11



Hispanic students represent the greatest proportion of students enrolled in self-contained HILT mathematics courses (Figure 16).

Figure 17. Middle School Mathematics Enrollment in Special Education Courses by Race, Hispanic Origin, 2006-07 to 2010-11



Enrollment in self-contained special education mathematics courses disproportionately includes Hispanic and black students (Figure 17).

Table 11 shows overall enrollment at high schools increasing by 11 percent, from almost 4,800 students in 2006–07 to more than 5,300 students in 2010–11. During this time, the proportion of high school students receiving grade-level mathematics instruction increased by 5 percentage points to 48 percent, and the proportion of students receiving accelerated instruction increased by one percentage point to 38 percent. The increases in are offset by small decreases in the proportion of students taking self-contained mathematics courses (special education or HILT), remedial courses, and extra support course work.

Table 11. High School Mathematics Enrollment by Course Type, 2006-07 through 2010-11

Course Type	2006-07		2007-08		2008-09		2009-10		2010-11	
	N	%	N	%	N	%	N	%	N	%
Total	4789	100	4865	100	5042	100	5138	100	5329	100
Grade Level	2076	43	2191	45	2120	42	2346	46	2561	48
Accelerated	1751	37	1800	37	1966	39	1909	37	2004	38
SPED	138	3	117	2	133	3	156	3	128	2
HILT	151	3	147	3	128	3	120	2	81	2
Remedial	44	1	47	1	40	1	38	1	30	1
Extra Support	629	13	563	12	655	13	569	11	525	10

A review of high school enrollment by course types and by grade level (Table 12) shows the following:

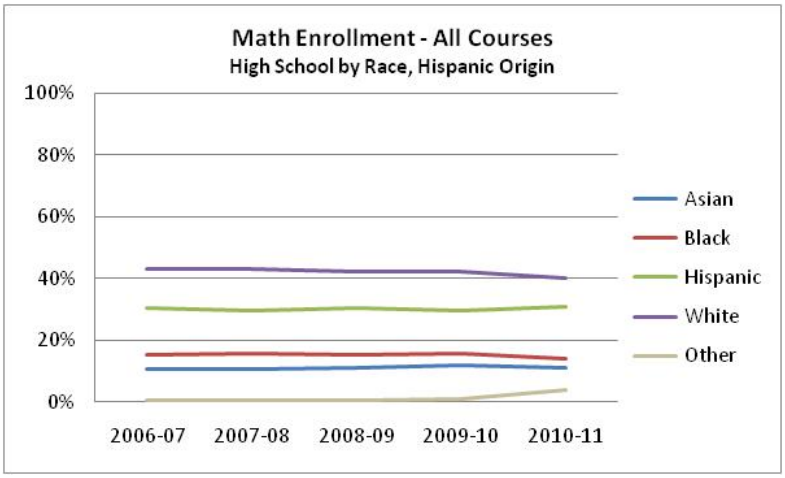
- The proportion of students in self-contained SPED or HILT mathematics classes was consistently low.
- There was an increase in the proportion of students enrolled in an accelerated course across Grades 9, 11, 10 and 12.

Table 12. High School Mathematics Enrollment by Course Type and Grade Level, 2006-07 through 2010-11

Grade	Course Type	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	%	N	%	N	%	N	%	N	%
09	Total	1382	100	1419	100	1437	100	1356	100	1424	100
	Grade Level	363	26	351	25	367	26	394	29	481	34
	Accelerated	607	44	673	47	664	46	619	46	678	48
	SPED	63	5	45	3	54	4	57	4	57	4
	HILT	107	8	102	7	88	6	67	5	41	3
	Remedial	32	2	31	2	27	2	25	2	20	1
	Extra Support	210	15	217	15	237	16	194	14	147	10
10	Total	1288	100	1296	100	1377	100	1379	100	1358	100
	Grade Level	393	31	452	35	452	33	492	36	520	38
	Accelerated	600	47	605	47	667	48	631	46	607	45
	SPED	32	2	36	3	27	2	44	3	29	2
	HILT	26	2	19	1	14	1	22	2	18	1
	Remedial	10	1	13	1	11	1	12	1	8	1
	Extra Support	227	18	171	13	206	15	178	13	176	13
11	Total	1164	100	1225	100	1197	100	1354	100	1345	100
	Grade Level	803	69	872	71	786	66	949	70	928	69
	Accelerated	195	17	189	15	266	22	262	19	282	21
	SPED	24	2	14	1	22	2	23	2	21	2
	HILT	5	0	10	1	6	1	4	0	3	0
	Remedial	2	0	2	0	1	0	1	0	2	0
	Extra Support	135	12	138	11	116	10	115	8	109	8
12	Total	927	100	892	100	990	100	999	100	1132	100
	Grade Level	517	56	508	57	508	51	498	50	606	54
	Accelerated	340	37	333	37	369	37	397	40	437	39
	SPED	19	2	22	2	30	3	32	3	13	1
	HILT	0	0	1	0	0	0	1	0	2	0
	Remedial	0	0	0	0	1	0	0	0	0	0
	Extra Support	51	6	28	3	82	8	71	7	74	7

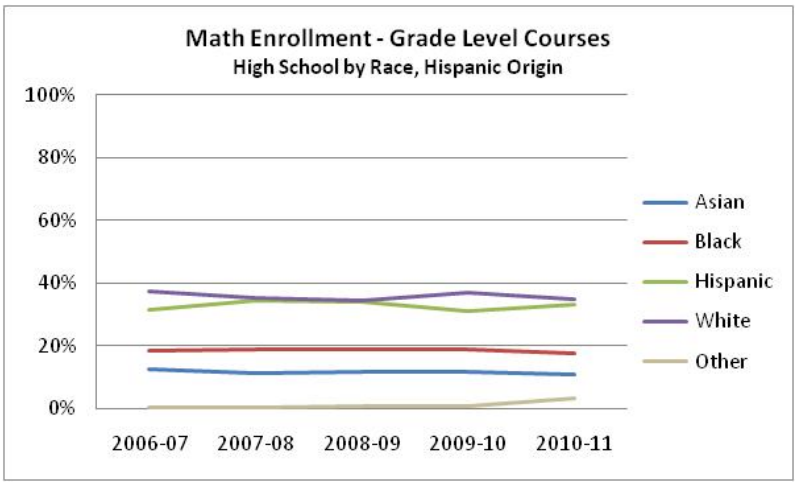
High school enrollment data indicates a continued disproportion in diversity of the students in taking accelerated mathematics courses.

Figure 18. High School Mathematics Enrollment by Race, Hispanic Origin, 2006-07 to 2010-11



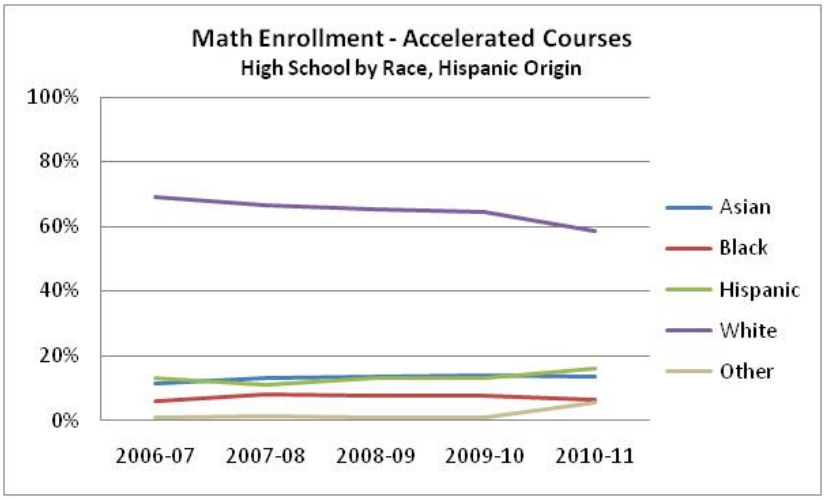
Participation in high school mathematics is not a requirement at all grades; however, the proportion of students participating in high school mathematics matches the diversity of the APS high school population (Figure 18).

Figure 19. High School Mathematics Enrollment in Standard Courses by Race, Hispanic Origin, 2006-07 to 2010-11



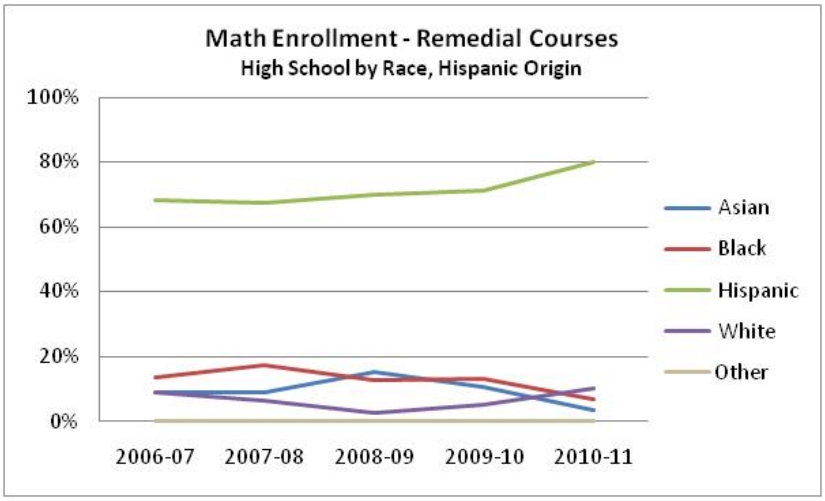
In high school, enrollment in grade-level courses looks similar to the diversity of APS. White students are underrepresented. (Figure 19).

Figure 20. High School Mathematics Enrollment in Accelerated Courses by Race, Hispanic Origin, 2006-06 to 2010-11



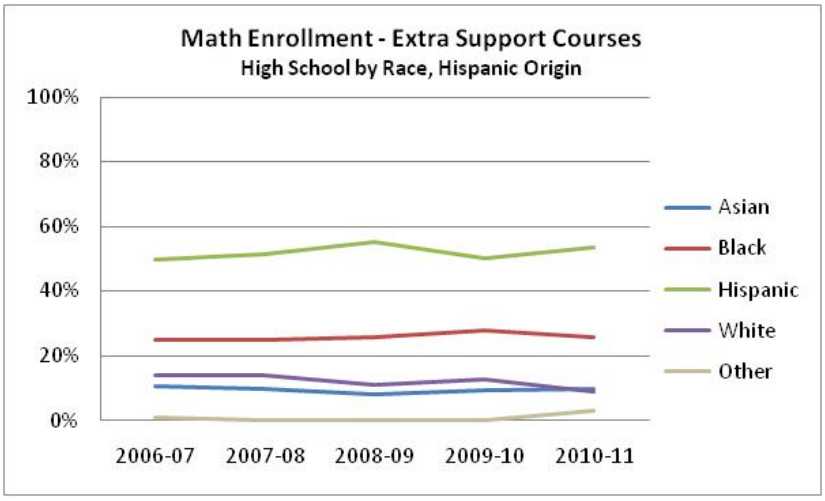
White student are overrepresented in accelerated high school math courses, but this proportion has decreased during the past five years (Figure 20).

Figure 21. High School Mathematics Enrollment in Remedial Courses by Race, Hispanic Origin, 2006-07 to 2010-11



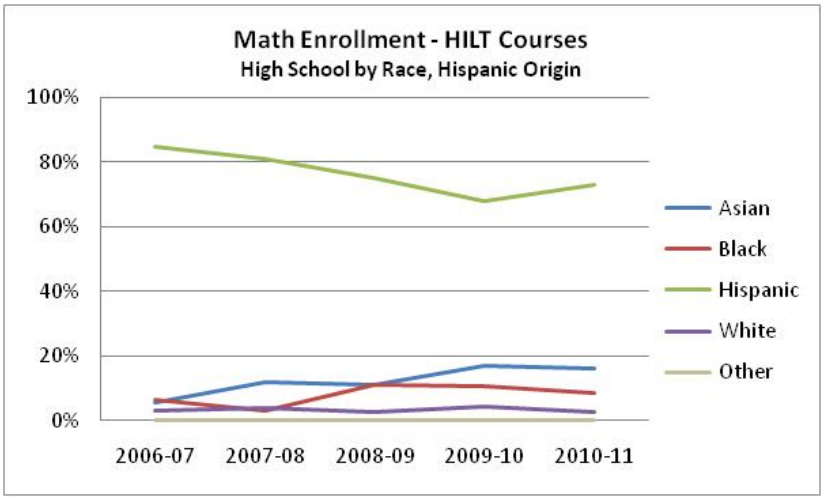
Hispanic students make up the majority of students enrolled in remedial high school math courses (Figure 21).

Figure 22. High School Mathematics Enrollment in Extra Support Courses by Race, Hispanic Origin, 2006-07 to 2010-11



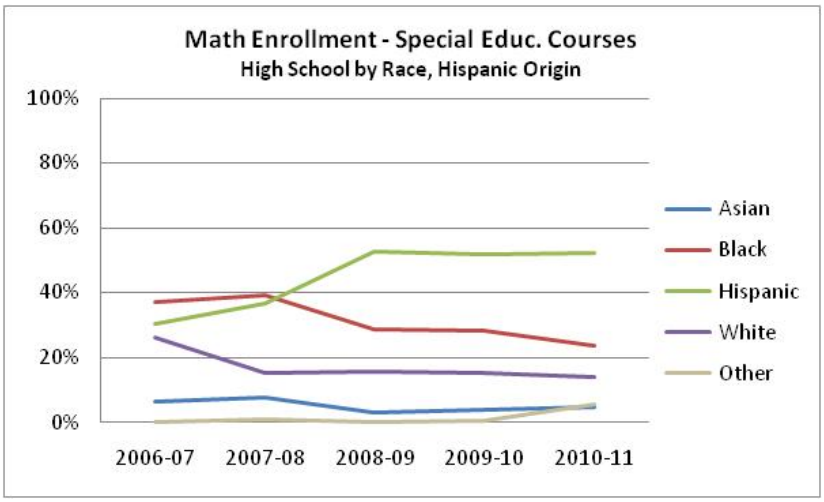
High school math courses categorized as extra support are diverse, although white students are underrepresented in these courses and black and Hispanic student are overrepresented (Figure 22).

Figure 23. High School Mathematics Enrollment in HILT Courses by Race, Hispanic Origin, 2006-07 to 2010-11



Hispanic students represent the majority of students enrolled in self-contained HILT math courses Figure 23).

Figure 24. High School Mathematics Enrollment in Special Education Courses by Race, Hispanic Origin, 2006-07 to 2010-



Enrollment in self-contained special education mathematics courses shows that the proportion of Hispanic students increased to current levels in 2008–09, in direct contrast to the decrease among black students (Figure 24).

AP and IB courses are included in the accelerated courses identified for high school. Participation by race and Hispanic origin and are reported in Table 13.

IB courses are only available at Washington-Lee. Among the IB mathematics courses are the following:

- Enrollment decreased in IB math studies, and the students enrolled during 2010–11 more closely reflect the makeup of the APS student population.
- Enrollment increased in IB Math Methods Precalculus and IB Methods Calculus, and the gaps between white and others remain large because the majority of students taking these courses are white.

AP mathematics courses are offered at the three high schools and at H-B Woodlawn. Participation in the mathematics courses has shown the following:

- Increased in all three of the AP mathematics offerings.
- Although participation overall is low, the proportion of Hispanic students participating in the two AP Calculus offerings has increased significantly.
- The number of black students participating in AP Statistics has doubled.

APS's enrollment data suggests the following:

- White students are more likely to enroll in accelerated math programs than the other student groups. There is a high proportion of students taking accelerated classes overall (although the proportion has decreased in middle school).
- There are notable imbalances, as reflected by the overrepresentation of white students in accelerated classes and the under representation of black and Hispanic students.

- During the past five years the proportion of middle school students enrolled in accelerated courses has decreased.

Table 13. High School Mathematics Enrollment in Specific Courses by Race, Hispanic Origin, 2006-07 through 2010-11.

Course	Race	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
IB Math Studies	Asian	5	11.9	3	11.1	5	14.7	4	11.1	5	17.2
	Black	1	2.4	3	11.1	3	8.8	5	13.9	3	10.3
	Hispanic	8	19.0	6	22.2	7	20.6	5	13.9	6	20.7
	White	28	66.7	15	55.6	19	55.9	22	61.1	12	41.4
	Other									3	10.3
	Total	42	100.0	27	100.0	34	100.0	36	100.0	29	100.0
IB Math Methods Precalculus	Asian	5	9.4	5	8.2	8	12.1	14	17.1	8	8.7
	Black	4	7.5	4	6.6	3	4.5	5	6.1	3	3.3
	Hispanic	3	5.7	4	6.6	6	9.1	7	8.5	11	12.0
	White	41	77.4	46	75.4	48	72.7	55	67.1	64	69.6
	Other			2	3.3	1	1.5	1	1.2	6	6.5
	Total	53	100.0	61	100.0	66	100.0	82	100.0	92	100.0
IB Math Methods Calculus	Asian	3	9.7	4	11.1	2	4.1	7	13.0	7	12.1
	Black	2	6.5	3	8.3	2	4.1	1	1.9	2	3.4
	Hispanic	2	6.5	2	5.6	5	10.2	6	11.1	6	10.3
	White	24	77.4	27	75.0	38	77.6	39	72.2	37	63.8
	Other					2	4.1	1	1.9	6	10.3
	Total	31	100.0	36	100.0	49	100.0	54	100.0	58	100.0
AP Statistics	Asian	11	11.1	9	8.4	14	14.1	21	15.7	29	17.8
	Black	6	6.1	10	9.3	7	7.1	7	5.2	12	7.4
	Hispanic	11	11.1	4	3.7	5	5.1	22	16.4	19	11.7
	White	71	71.7	84	78.5	72	72.7	82	61.2	99	60.7
	Other					1	1.0	2	1.5	4	2.5
	Total	99	100.0	107	100.0	99	100.0	134	100.0	163	100.0
AP Calculus AB	Asian	9	7.9	19	13.9	28	15.1	23	15.4	27	13.9
	Black	1	.9	13	9.5	10	5.4	5	3.4	4	2.1
	Hispanic	5	4.4	8	5.8	28	15.1	11	7.4	31	16.0
	White	99	86.8	95	69.3	118	63.4	108	72.5	121	62.4
	Other			2	1.5	2	1.1	2	1.3	11	5.7
	Total	114	100.0	137	100.0	186	100.0	149	100.0	194	100.0
AP Calculus BC	Asian	14	16.5	15	22.7	16	14.2	19	18.6	18	18.2
	Black	2	2.4	2	3.0	5	4.4	4	3.9		
	Hispanic	4	4.7	5	7.6	4	3.5	10	9.8	15	15.2
	White	65	76.5	44	66.7	87	77.0	68	66.7	61	61.6
	Other					1	.9	1	1.0	5	5.1
	Total	85	100.0	66	100.0	113	100.0	102	100.0	99	100.0
Multivariable Calculus	Asian			3	20.0	3	33.3	8	16.0	9	23.7
	Black	2	8.7	1	6.7					1	2.6
	Hispanic	2	8.7							2	5.3
	White	19	82.6	11	73.3	6	66.7	41	82.0	25	65.8
	Other							1	2.0	1	2.6
	Total	23	100.0	15	100.0	9	100.0	50	100.0	38	100.0
Total High School	Asian	-	10.6	-	10.8	-	11.1	-	11.8	-	11
	Black	-	15.2	-	15.8	-	15.3	-	15.7	-	14.1
	Hispanic	-	30.5	-	29.6	-	30.5	-	29.5	-	31
	White	-	43.1	-	43.2	-	42.4	-	42.2	-	40
	Other	-	0.5	-	0.6	-	0.6	-	0.8	-	4

Longitudinal Study of Enrollment

Planning and Evaluation provided HRC with student data for an analysis of longitudinal enrollment patterns. The cohort included 819 students who were enrolled continuously in APS, beginning in Grade 3 in 2003–04 through the completion of Grade 9 in 2009–10. The data set included math course enrollment beginning in Grade 6 when course codes were assigned, together with demographic variables.

Hanover's longitudinal study (Appendix G) identified the following in its longitudinal analysis of enrollment patterns.

- There were a higher percentage of students enrolled in accelerated math programs in the eighth grade than in other grades.
- Overall, students moved back into grade-level programs in the ninth grade (i.e., there was a higher percentage of students enrolled in grade-level programs in the ninth grade).
- White students were more likely to enroll in accelerated math programs than other groups of students. On average, close to two thirds of white students took accelerated programs.
- SPED students were the least likely group to enroll in an accelerated program (12 percent).
- The proportion of black students in remedial/self-contained courses nearly doubled from 17 percent in the sixth grade to 32 percent in the eighth grade.
- Male and female students were close enough in their course enrollment patterns that their differences were not statistically observable.

Summary of Implementation Results

How well did APS implement the mathematics program? To what degree are the best practices for teaching evident in daily mathematics instruction? And to what extent do students have access to higher level mathematics courses? Classroom observations and student enrollment patterns suggest a number of strengths as well as some challenges.

Elementary Mathematics: Observations indicate that instructional practices have improved since 2005.

- Students knew the routines and were on task during the time they engaged in productive experiences.
- The content was accurate, and new learning was connected to previous learning.
- Students engaged in discourse, and most lessons were rated "effective" in deepening students' understanding of math.

APS cannot pinpoint a single cause for the improvements but instead note that a number of changes were probably at play including external requirements to meet AYP benchmarks; the addition of a mathematics coach at each school; the focus on instructional practices and use of

the mathematics resources; and the schools ensuring that students had uninterrupted instructional time for mathematics.

Future K–3 efforts should emphasize the quality and amount of the teacher's use of language–simulation and facilitation (language modeling) and more frequent instructional discussions and activities that promote higher-order thinking skills (concept development). Upper elementary instruction needs to ensure that all students in the classroom are engaging in purposeful dialogue, which guides students' understanding of content and language development (instructional dialogue), as well as facilitating students' use of skills such as analysis, problem solving, reasoning, and creation through the application and knowledge of skills (analysis and problem solving).

Middle School Mathematics: Observations suggest some shifts in instructional practices since 2005.

- Like the elementary observations, students knew the classroom routines and were on task while engaging in productive experiences.
- Classrooms demonstrated the strongest evidence of instructional strategies that support differentiation, compared to elementary and high school observations.
- Content was accurate, a notable improvement from 2005.
- Discourse was not as prevalent as it was in the previous evaluation, and the cognitive complexity of tasks did not facilitate higher-order thinking skills.

Enrollment patterns in middle school mathematics show the following:

- An increase in the proportion of students taking grade-level math, which is offset by decreases in the proportion of students in special education or HILT mathematics and in students taking accelerated courses.
- Black and Hispanic students are underrepresented in accelerated courses.

Middle school mathematics must seek ways to make instruction relevant for students (regard for adolescent perspective). The instruction needs to consistently integrate activities that demonstrate students using analysis, problem solving, reasoning, and creation through the application and knowledge of skills (analysis and problem solving).

High School Mathematics: Observations suggest some declines in the instructional practices since 2005.

- There was evidence of a positive climate for student learning.
- Students engaged in productive experiences.
- Mathematical content was mostly accurate.
- New learning was not always connected to previous learning.
- There was little evidence of discourse or cognitive complex tasks.

Enrollment patterns in high school mathematics show the following:

- A decrease in the proportion of middle school students taking accelerated mathematics courses.
- An increase in the proportion of students taking grade-level math.
- A decrease in the proportion of students in self-contained special education or HILT mathematics, which includes an increase for Hispanic students and a decrease for black students.
- The underrepresentation of black and Hispanic students in accelerated courses.
- The overrepresentation of Hispanic students in below grade level courses.
- The over representation of Hispanic and black students in extra support courses.

High school mathematics needs to ensure that instruction is relevant for students (regard for adolescent perspective). The instruction needs to consistently integrate activities that demonstrate students using analysis, problem solving, reasoning, and creation through the application and knowledge of skills (analysis and problem solving).

What Were the Outcomes for APS Students?

This report uses assessment results to gauge the levels of student success by addressing the following evaluation questions:

- To what degree do all students and all student groups demonstrate rising achievement in mathematics?
- How does Arlington's performance on assessments compare with state and national results?

Local Mathematics Assessments

Originally, this evaluation intended to address the degree to which local assessments predict performance on standardized tests and/or early placement in higher level mathematics courses. This question was not addressed because of difficulties with gathering student-level results on the local assessments. Table 14 identifies the timeline of countywide elementary mathematics assessments. APS develops the quarterly assessments, and that the paper tests are scored manually by teachers. After scoring, schools are required to put the results into a locally developed reporting tool.

Table 14. Schedule of Required APS Mathematics Assessments

<table>
<tr><th></th><th>End of First Week of School</th><th>End of First Quarter</th><th>End of Second Quarter</th><th>End of Third Quarter</th><th>End of School Year</th></tr>
<tr><td>Kindergarten</td><td rowspan="6">Beginning of School Inventory (K–5)</td><td>*</td><td rowspan="6">Mid Year Assessment (K–5)</td><td>*</td><td rowspan="3">End of Year Assessment (K–2)</td></tr>
<tr><td>Grade 1</td><td rowspan="5">Quarter 1 Assessment (1–5)</td><td rowspan="5">Quarter 3 Assessment (1–5)</td></tr>
<tr><td>Grade 2</td></tr>
<tr><td>Grade 3</td><td rowspan="3">Grade Level SOL Assessments (3–5)</td></tr>
<tr><td>Grade 4</td></tr>
<tr><td>Grade 5</td></tr>
</table>

*“Schools in need of improvement” are required to administer the Quarter 1 and 3 assessments to kindergarten students.

There are a number of concerned that were identified with this local assessment process.

- The locally developed assessments were not proven to be valid or reliable measures of student progress.
- APS had not developed multiple versions of the test, so the items on each test were not released with parent reports. Because the locally developed reporting tool was fairly basic, student reports did not provide specific explanations of the results by standards for parents.
- Tests were administered and scored by school staff, and the process required a lot of staff time to produce student and school results.
- The locally developed reporting tool did not feed into a central reporting system. Currently, any monitoring of student progress over time is done within the classroom. Also, this process makes it difficult for most schools and the central office to monitor results by teacher, by grade, by school, by standards, and so forth.
- Finally, the entire process was subject to human error.

The process for the quarterly mathematics assessments needs to be improved before APS can expect to utilize timely results that can do all of the following:

- Identify and target resources that meet the needs of individual students.
- Identify strengths and concerns within a particular class, grade level, or school that inform adjustments to instruction.
- Inform administrators about areas that may need additional support through professional development, instructional tools, and so forth.

Standards of Learning (SOLs)

The Virginia Department of Education identifies the SOLs as "the minimum grade level and subject matter educational objectives, described as the knowledge and skills necessary for success in school and for preparation for life, that students are expected to meet in Virginia public schools and specified by the Standards of Quality" (SOQ).[9]

The Mathematics Standards of Learning identify essential academic content at each grade level for sequential learning. The content of the mathematics standards supports the following five goals for students: becoming mathematical problem solvers, communicating mathematically, reasoning mathematically, making mathematical connections, and using mathematical representations to model and interpret practical situations.

It is important to note that this evaluation uses the following approach to reporting SOLs, which will account for differences when comparing these results to other SOL reports. The SOL data presented in this evaluation does the following:

- Uses unadjusted results. Some SOL reports use adjusted data, which makes allowances for certain transfer students, students who speak little or no English, and students who pass retakes of tests after receiving remedial instruction.
- Is limited to the first attempt by any student on a mathematics SOL assessment and excludes retakes by the same student.
- Does not include students who are receiving math instruction through contracted services.

All APS students are tested annually on the mathematics SOLs from Grade 3 to Grade 8. Some students accelerate mathematics instruction in middle school and may not take the grade-level mathematics courses or tests. The students may take higher grade-level courses or tests. At the middle school level, end-of-course SOL assessments are given regularly for Algebra I, occasionally for Geometry, and less often for Algebra II.

To prepare the data for all the assessments, Planning and Evaluation created a data set specific to the requirements of this evaluation. Some of the assessment results are available in our student information system, eSchool+, but results for some assessments are not included in the student's electronic folder.

Elementary SOLs

The 2009–10 elementary mathematics SOL passing rate exceeded 90 percent for Grades 3 and 5, but it was lower at Grade 4, where 86 percent of the students passed (Table 15). Elementary results cover 2004–05 through 2009–10. Note that there was no Grade 4 SOL test in 2004–05.

[9] Website http://www.doe.virginia.gov/glossaries/glossary.pdf Virginia Department of Education Glossary of Educational Terms.

Table 15. Elementary Mathematics SOL Results, 2004–05 to 2010–11

School Year	Third Grade SOL		Fourth Grade SOL		Fifth Grade SOL	
	No. Tested	% Passing	No. Tested	% Passing	No. Tested	% Passing
2009-10	1619	94	1446	86%	1399	92%
2008-09	1440	90	1419	83%	1324	89%
2007-08	1426	88	1334	83%	1312	88%
2006-07	1326	89	1323	82%	1280	87%
2005-06	1333	92	1309	77%	1245	82%
2004-05	1358	87	-	-	1428	79%

An analysis of APS 2008–09 SOL performance, prepared for the 2010 Data Retreat, compared adjusted passing rates for APS and the state (Table 16). Although APS had passing rates on two tests that exceeded 90 percent, the local passing rate only exceeded the Virginia average on the Grade 3 assessment.

Table 16. Comparing APS and Virginia Performance on Elementary Mathematics SOL Assessments

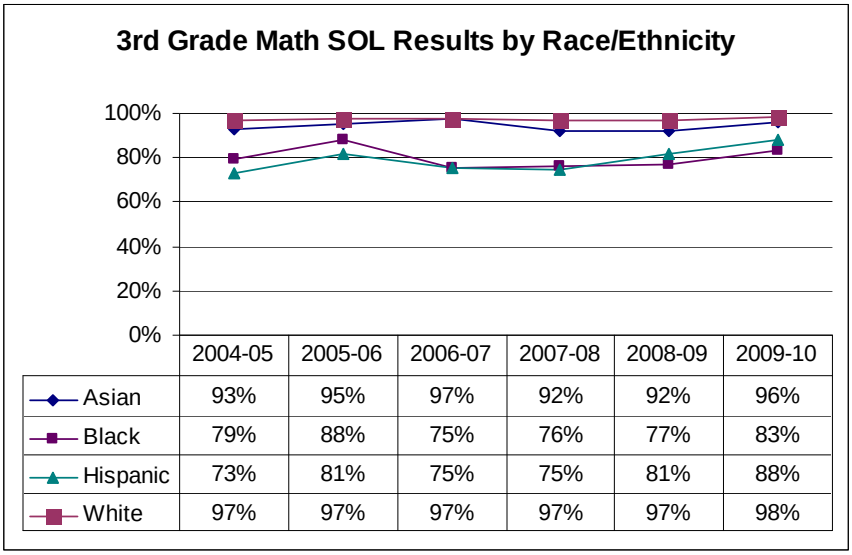
	2008-09 Average Passing Rate
Grade 3	APS exceeded VA passing rate
Grade 4	VA exceeded APS passing rate
Grade 5	APS and VA same passing rate

Elementary SOLs by Race, Hispanic Origin

To better understand these elementary SOL results, the next series of graphs examine results by race and Hispanic origin, economic status, students identified as limited English proficient (LEP), and students identified with disabilities (SPED).

The first three graphs focus on SOL results by race and Hispanic origin, with results from 2004–05 through 2009–10. The achievement gap is calculated by comparing the passing rate for Asian, black, or Hispanic students to the passing rate for white students.

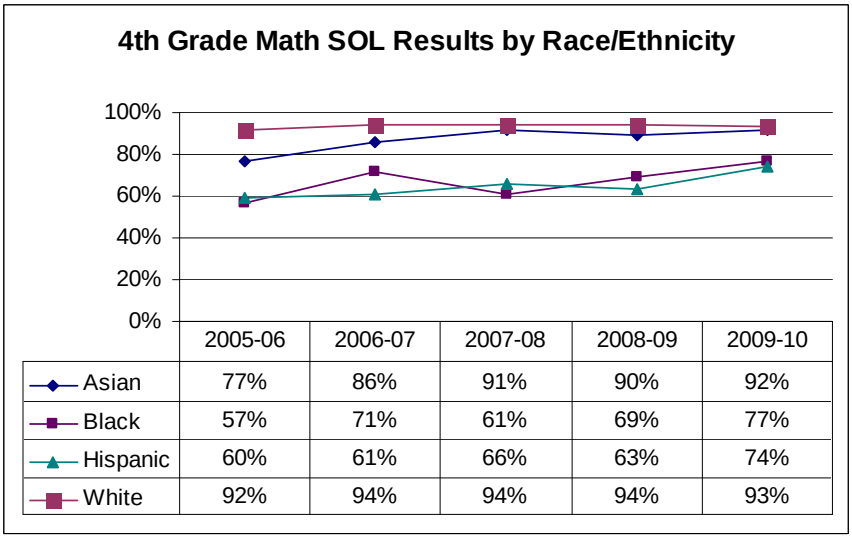
Figure 25. Grade 3 Mathematics SOL Results by Race and Ethnic Origin, 2004–05 to 2009–10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	93%	95%	97%	92%	92%	96%
Black	79%	88%	75%	76%	77%	83%
Hispanic	73%	81%	75%	75%	81%	88%
White	97%	97%	97%	97%	97%	98%

Results for Grade 3 show high passing rates (97 percent to 98 percent) for white students, with lower performance by black and Hispanic students (Figure 25). Over time, the passing rates increased for both black students (4 percentage points) and Hispanic students (15 percentage points).

Figure 26. Grade 4 Mathematics SOL Results by Race and Ethnic Origin, 2004–05 to 2009–10

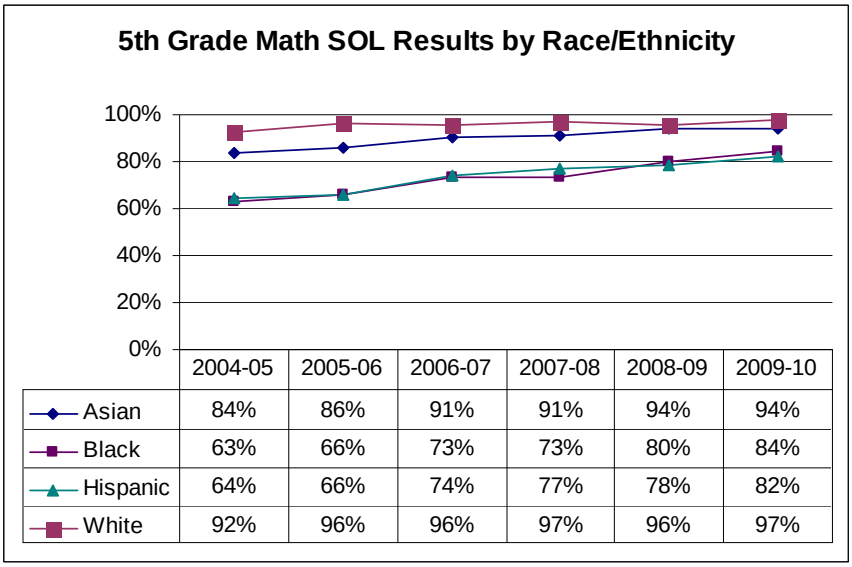


	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	77%	86%	91%	90%	92%
Black	57%	71%	61%	69%	77%
Hispanic	60%	61%	66%	63%	74%
White	92%	94%	94%	94%	93%

Results for Grade 4 show lower passing rates among all groups (Figure 26). In 2009–10 92 percent of Asian students and 93 percent of white students passed the SOL, compared with 77 percent of black students and 74 percent of Hispanic students.

It is important to note there were significant gains in the passing Grade 4 mathematics SOL passing rates for black (8 percentage points) and Hispanic (11 percentage points) from 2008–09 and 2009–10.

Figure 27. Grade 5 Mathematics SOL Results by Race and Ethnic Origin, 2004–05 to 2009–10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	84%	86%	91%	91%	94%	94%
Black	63%	66%	73%	73%	80%	84%
Hispanic	64%	66%	74%	77%	78%	82%
White	92%	96%	96%	97%	96%	97%

Results for Grade 5 show that the passing rates have seen significant increases among all other groups except for white students (Figure 27). The passing rates increased for Asian students by 10 percentage points, Hispanic students by 18 percentage points, and black students by 21 percentage points.

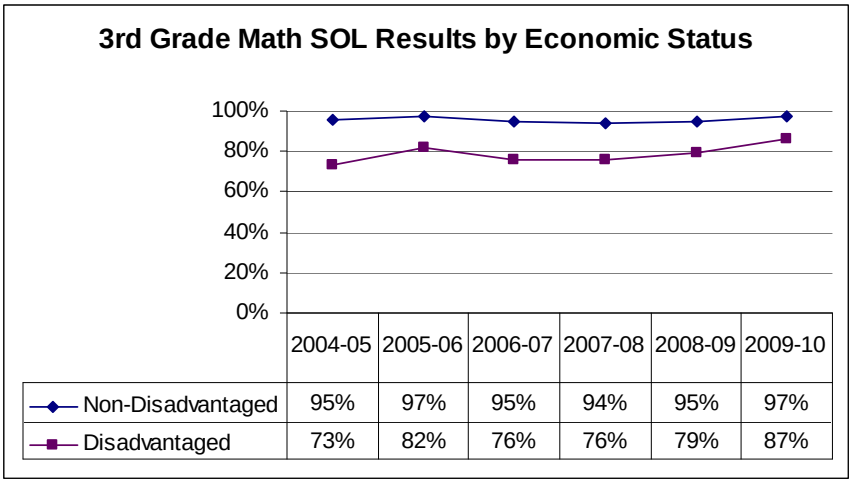
Elementary SOLs by Gender

Elementary SOL results were then examined by gender. For the SOL assessments, there was no real difference in performance between males and females so that information is not included in this report.

Elementary SOLs by Economic Status

Figure 28 through Figure 30 focus on SOL results by economic status, with results from 2004-–05 through 2009-–10. Students receiving free or reduced cost lunch are identified as disadvantaged, and the remainder of students is identified as non-disadvantaged. The achievement gap is calculated by comparing the passing rate for disadvantaged students to non-disadvantaged students.

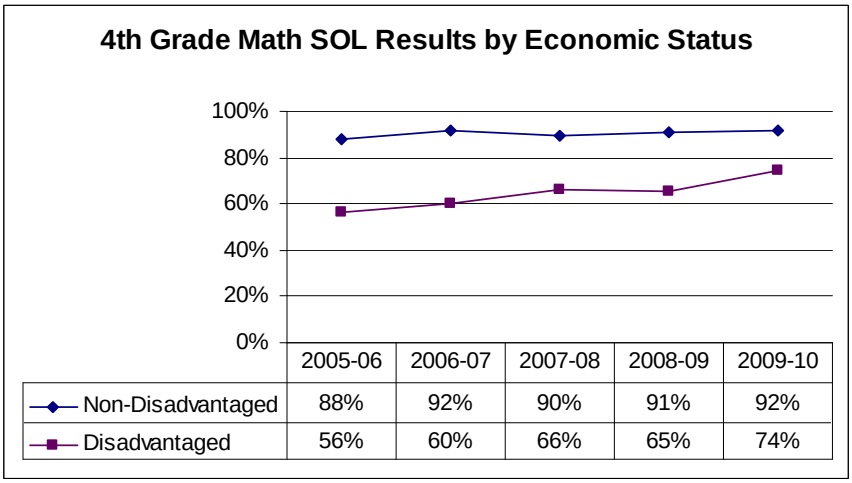
Figure 28. Grade 3 Mathematics SOL Results by Economic Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	95%	97%	95%	94%	95%	97%
Disadvantaged	73%	82%	76%	76%	79%	87%

When comparing Grade 3 results by economic status, students identified as disadvantaged pass at lower rates than their peers (Figure 28). Over time, their passing rates have increased by 14 percentage points to 87 percent.

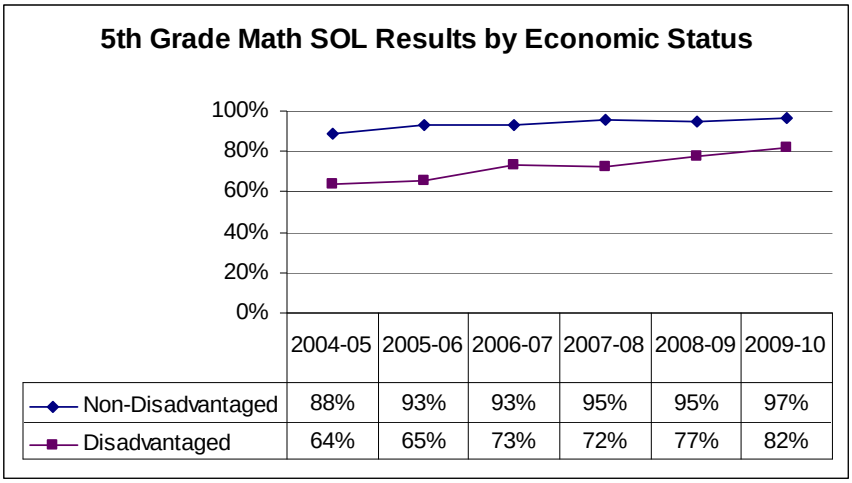
Figure 29. Grade 5 Mathematics SOL Results by Economic Status, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	88%	92%	90%	91%	92%
Disadvantaged	56%	60%	66%	65%	74%

Results for Grade 4 show that both groups struggled with the assessment, but the group identified as disadvantaged continues to lag 18 percentage points behind their peers (Figure 29). For this group, the gap has narrowed by more than half.

Figure 30. Grade 5 Mathematics SOL Results by Economic Status, 2004–05 to 2009–10



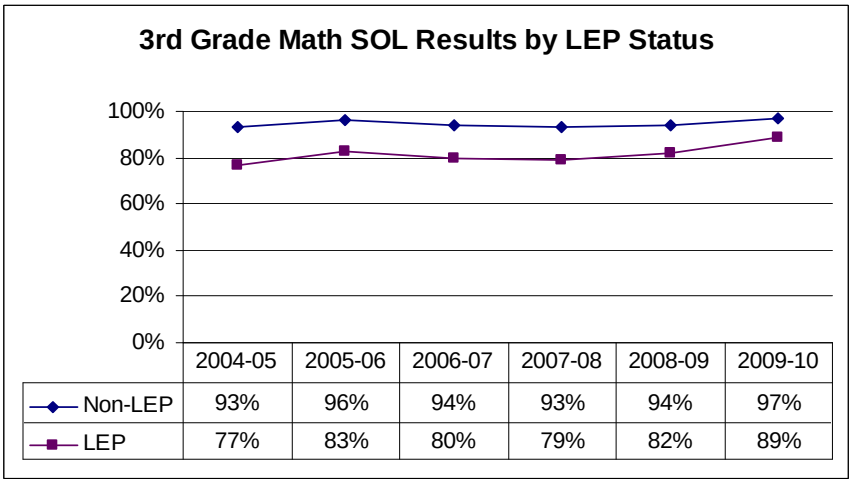
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	88%	93%	93%	95%	95%	97%
Disadvantaged	64%	65%	73%	72%	77%	82%

Again, results for Grade 5 show that students identified as economically disadvantaged pass at lower rates than their peers (Figure 30). Although passing rates have improved by both groups, the passing rate for economically disadvantaged students remains low at 82 percent.

Elementary SOLs by LEP Status

The following SOL results for LEP students show results from 2004–05 through 2009–10. This group includes student receiving services and those who have exited service in the last two years. In calculating the gap, the passing rate for LEP students is compared to the passing rate for non-LEP students.

Figure 31. Grade 3 Mathematics SOL Results by LEP Status, 2004-05 to 2009-10

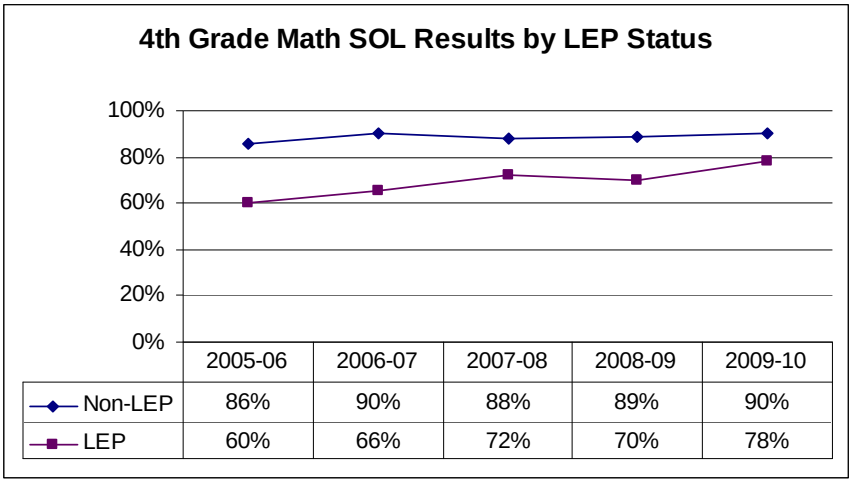


	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	93%	96%	94%	93%	94%	97%
LEP	77%	83%	80%	79%	82%	89%

Students identified as LEP pass at lower rates than their peers. The gap in 2004–05 was 16 percentage points (Figure 31). The gap for Grade 3 decreased to 8 percentage points in 2009–10.

Overall SOL performance on the Grade 4 test was lower than on other elementary assessments. The passing rates for non-LEP students have fluctuated between 86 percent and 90 percent during the five years reported.

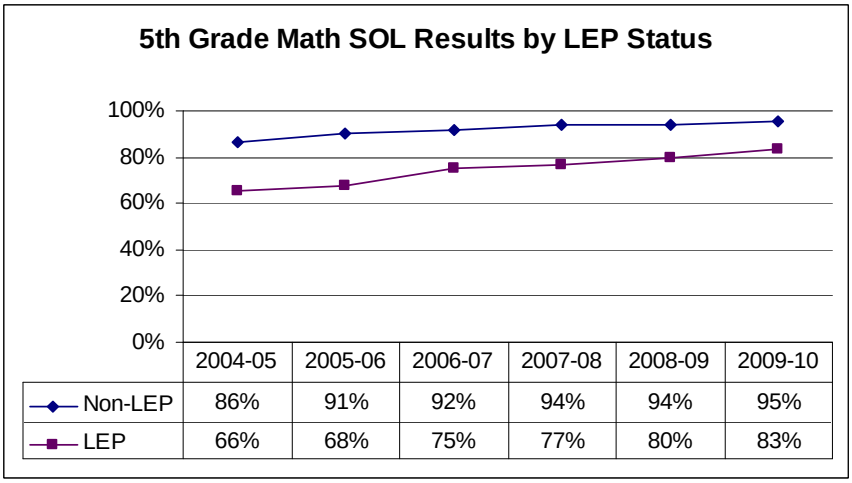
Figure 32. Grade 4 Mathematics SOL Results by LEP Status, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	86%	90%	88%	89%	90%
LEP	60%	66%	72%	70%	78%

Performance by LEP students has increased steadily from a passing rate of 60 percent in 2005–06 (the first year the Grade 4 test was administered) to 78 percent, an increase of 18 percentage points, but still below the average passing rate (86 percent) for Grade 4 students (Figure 32).

Figure 33. Grade 5 Mathematics SOL Results by LEP Status, 2004-05 to 2009-10



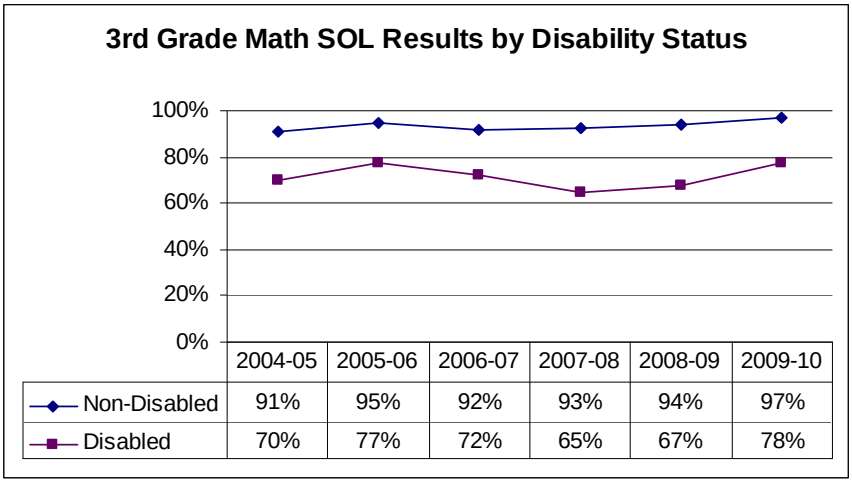
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	86%	91%	92%	94%	94%	95%
LEP	66%	68%	75%	77%	80%	83%

On the Grade 5 mathematics SOL test, non-LEP students have seen passing rates rise by 9 percentage points to 95 percent in 2010–11 (Figure 33). During the same period, the passing rate for LEP students rose 17 percentage points to 83 percent.

Elementary SOLs by Students Identified with Disabilities

For the final examination of elementary SOL results, students are grouped by whether they are disabled or whether they are not disabled, with results from 2004–05 through 2009–10. The gap is calculated by comparing the passing rate for disabled students to the passing rate for nondisabled students.

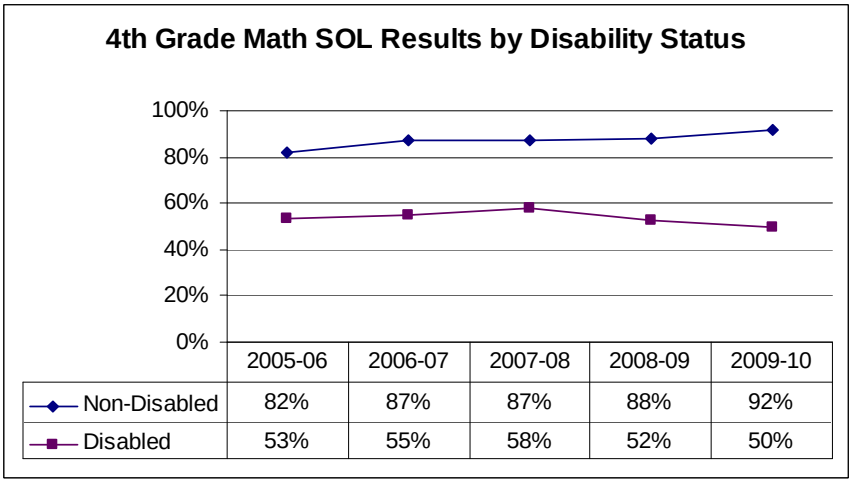
Figure 34. Grade 3 Mathematics SOL Results by Disability Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	91%	95%	92%	93%	94%	97%
Disabled	70%	77%	72%	65%	67%	78%

The nondisabled passing rate on the Grade 3 SOL increased by 6 percentage points to 97% (Figure 34.) The passing rates for students identified with disabilities were lower, starting at 70 percent for the same time period and increasing by 8 percentage points after five years.

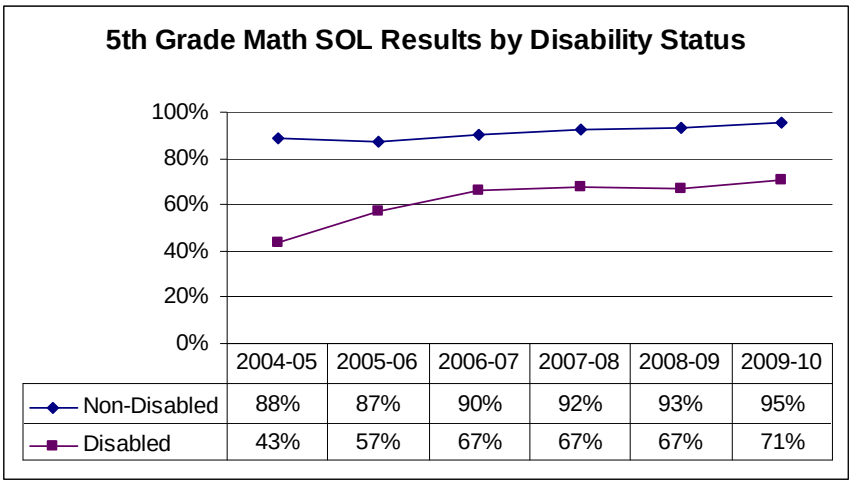
Figure 35. Grade 4 Mathematics SOL Results by Disability Status, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	82%	87%	87%	88%	92%
Disabled	53%	55%	58%	52%	50%

Passing rates on the Grade 4 SOL showed larger gaps based on disability. In 2005–06 the gap was 29 percentage points, and the gap increased as the passing rate rose for nondisabled students and decreased to 50 percent for disabled students (Figure 35).

Figure 36. Grade 5 Mathematics SOL Results by Disability Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	88%	87%	90%	92%	93%	95%
Disabled	43%	57%	67%	67%	67%	71%

Trends for Grade 5 show improvements by both groups, with the passing rate increasing by 7 percentage points to 95 percent for nondisabled students and increasing by 28 percentage points to 71 percent for disabled students (Figure 36).

Secondary SOLs

This section begins with strategic plan results for successfully completing Algebra I by Grade 8, then follows with overall performance, some details about accelerated performances, and finally detailed results for the individual assessments.

SOL results for Grades 6, 7, and 8 are presented with the end-of-course SOL assessments because APS has made a concerted effort to have all students successfully complete Algebra I by the end of Grade 8. The 2005–11 strategic plan included two indicators that targeted increasing the percentage of students passing Algebra I by the end of Grade 8 with a C or higher and decreasing the gap among student groups. Algebra I and Geometry I are considered advanced courses when taken by students in middle school. These students are more likely to take higher level math courses before they graduate. Figure 37 shows the results that target an increasing percentage of Grade 8 students completing Algebra I with a C or better. Enrollment has remained relatively constant at 50 percent since 2005–06. The gaps decreased among all groups, based on a combination of increased enrollment for all groups and decreased enrollment for white students from 75 percent to 67 percent. In 2010–11, the Virginia mathematics standards were revised to accelerate the learning of mathematics with the expectations that all students would complete Algebra I by the end of Grade 8.

Figure 37. 2005-2011 Performance on Strategic Plan Indicator for Increasing the Passing Rate and Decreasing the Gap Among Student Groups Successfully Completing Algebra I by Grade 8.

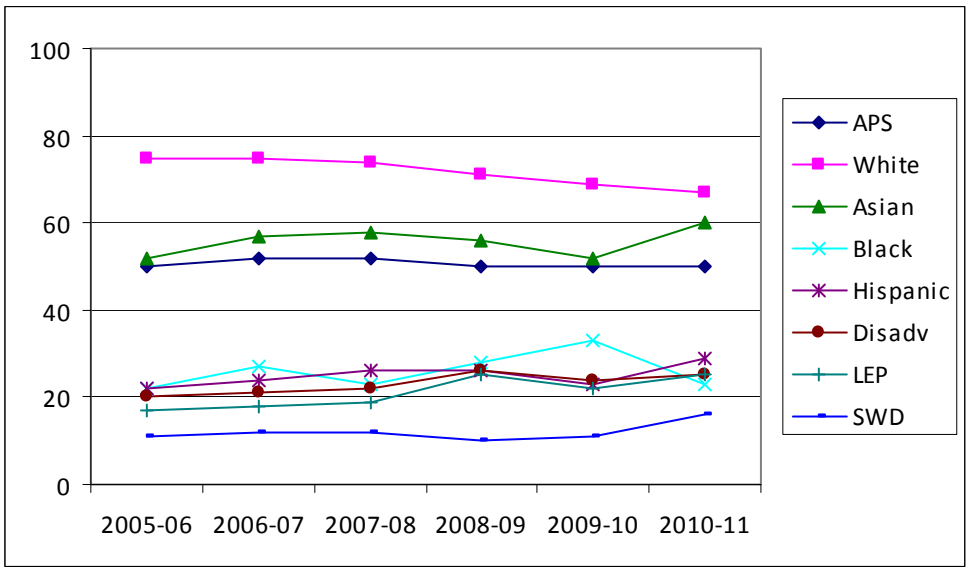
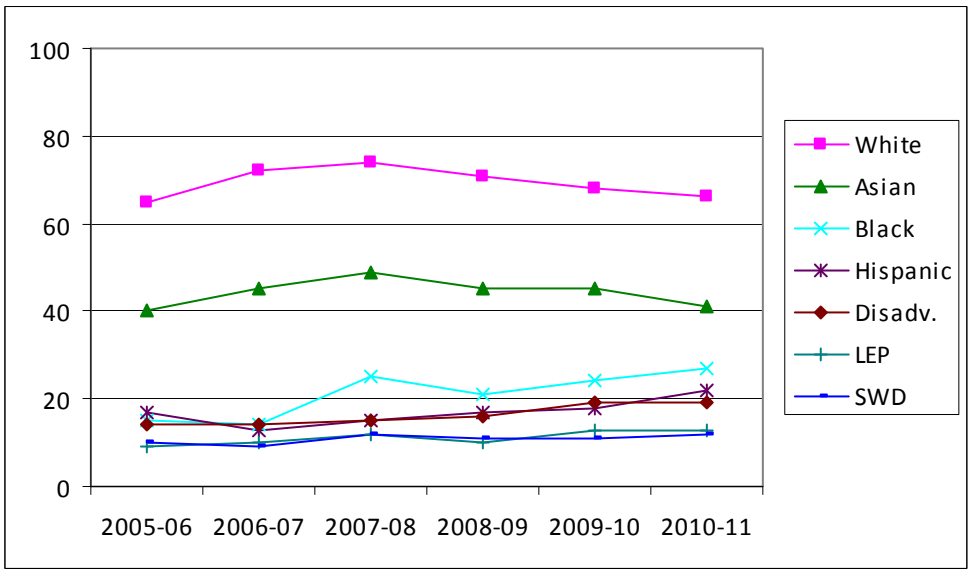


Figure 38 shows the results on the strategic plan indicator that targets a decrease in the gap between the percentage of Grade 9 students completing Geometry with a C or better. The gaps remain, but enrollment has increased for all student groups, with the exception of white students.

Figure 38. 2005-2011 Performance on Strategic Plan Indicator for Decreasing the Gap Among Student Groups Successfully Completing Geometry by Grade 9.



Secondary SOLs by Grade in Middle School

The passing rates on the 2009–10 middle school grade-level mathematics SOLS are generally low, with two thirds of the students passing Grade 6, 70 percent passing Grade 7 and 81 percent passing Grade 9 (Table 17). There have been fairly steady improvements in the passing rates for the Grade 6 and 7 assessments, although the passing rates for Grade 8 have fluctuated around 80 percent. The improvements are notable, given that many of the strongest math students are taking grade-level assessments at earlier grades, which will be addressed later in this section.

Table 17. Grade 6, 7 and 8 Mathematics SOL Results, 2004-05 to 2010-11

School Year	Sixth Grade SOL		Seventh Grade SOL		Eighth Grade SOL	
	No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
2009-10	934	66%	1138	70%	1025	81%
2008-09	888	59%	1097	72%	1002	84%
2007-08	794	50%	1048	65%	1024	82%
2006-07	754	49%	989	51%	1056	75%
2005-06	703	29%	1133	47%	1049	69%
2004-05	-	-	-	-	1296	77%

Passing rates on the three mathematics end-of course assessments are relatively high. More than 90 percent of all students have passed Algebra I consistently for the years reported in Table 18. The passing rate on the Algebra II SOL has decreased by three percentage points, although at the same time, the number of students taking the test increased by 4 percent. The passing rate on the Geometry end-of-course SOL has remained fairly constant at around 84 percent.

Table 18. End of Course Mathematics SOL Results, 2004-05 to 2010-11

School Year	Algebra I SOL		Geometry SOL		Algebra II SOL	
	No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
2009-10	1456	94%	1197	84%	1130	85%
2008-09	1370	94%	1292	84%	1198	86%
2007-08	1395	93%	1327	82%	1069	89%
2006-07	1441	90%	1190	85%	1101	85%
2005-06	1380	90%	1282	86%	1093	83%
2004-05	1481	91%	1296	83%	1086	88%

The same results, by the school level of the student completing the exam, are provided in Table 19. Middle school students completing the end-of-course assessments are accelerating their

study. It is notable that middle school students taking the end-of-course mathematics assessments outperform the high school test-takers on all three tests.

Table 19. End of Course Mathematics SOL Results by School Level, 2004-05 to 2010-11

Level	School Year	Algebra I SOL		Geometry SOL		Algebra II SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Middle School	2009-10	692	100%	129	100%	3	100%
	2008-09	647	99%	180	100%	-	-
	2007-08	702	99%	192	100%	3	100%
	2006-07	751	98%	151	99%	3	100%
	2005-06	684	98%	139	100%	-	-
	2004-05	737	98%	57	100%	-	-
High School	2009-10	763	89%	1068	82%	1126	85%
	2008-09	723	90%	1112	82%	1196	86%
	2007-08	693	87%	1134	79%	1066	89%
	2006-07	690	81%	1039	83%	1098	85%
	2005-06	696	81%	1143	85%	1092	83%
	2004-05	744	83%	1239	83%	1086	88%

Table 20 examines the passing rate of middle school students by grade and the tests taken. This examination provides a clearer picture of the performance by grade rather than by test. This result shows that the overall pass rates are still lower than the pass rates for elementary and EOC SOL test, but they are not as drastic as those by test.

Table 20. Secondary Mathematics SOL Results by Grade Level, 2004-05 to 2010-11

Grade	School Year	6th Grade		7th Grade		8th Grade		Algebra I		Geometry		Algebra II		All Tests	
		No. Tested	% Passing	No. Tested	% Passing	No. Tested	% Passing	No. Tested	% Passing	No. Tested	% Passing	No. Tested	% Passing	No. Tested	% Passing
6	2009-10	934	66%	302	99%	59	100%	1	*					1296	75%
	2008-09	888	59%	359	98%	68	100%	2	*					1317	72%
	2007-08	794	50%	393	98%	68	100%	3	100%					1258	68%
	2006-07	753	49%	377	95%	92	100%	1	*					1223	67%
	2005-06	702	29%	485	86%	107	100%			1	*			1295	56%
7	2009-10			836	59%	368	100%	144	100%	2	*			1350	74%
	2008-09			738	59%	383	100%	130	100%	3	100%	1	*	1255	76%
	2007-08			654	46%	378	99%	173	100%	1	*	1	*	1207	70%
	2006-07			611	25%	429	99%	193	100%			1	*	1234	62%
	2005-06	1	*	648	17%	394	94%	149	100%	1	*			1193	53%
8	2009-10					583	70%	547	99%	127	100%	3	100%	1260	86%
	2008-09					543	71%	515	99%	177	100%	1	*	1236	87%
	2007-08					557	71%	526	99%	191	100%	2	*	1276	87%
	2006-07					517	52%	557	97%	151	99%	2	*	1227	79%
	2005-06					520	47%	535	98%	137	100%	1	*	1193	76%

*Results not reported when fewer than 3 students took a test.

An analysis of APS SOL performance prepared for the 2010 Data Retreat using 2008–09 adjusted SOL results compared APS passing rates to state passing rates (Table 21). In the secondary assessments, Virginia exceeded the APS passing rate on only one of six tests, the Grade 6 test. Although we have not examined the acceleration efforts implemented across Virginia, we know that 33 percent of the APS students in Grade 6 did not take the Grade 6 SOL test but instead took accelerated mathematics SOL tests.

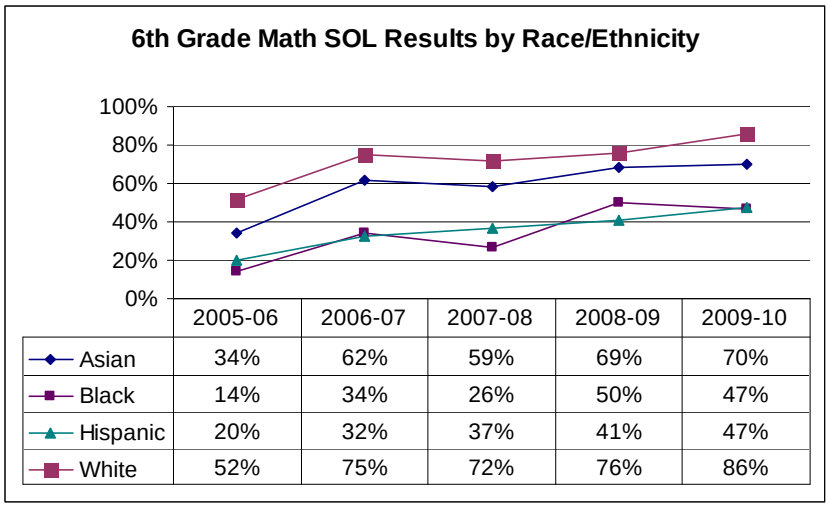
Table 21. Comparing APS and Virginia Performance on Middle School and End of Course Mathematics SOL Assessments.

	2008–09 Average Passing Rate
Grade 6	VA exceeded APS passing rate
Grade 7	APS exceeded VA passing rate
Grade 8	APS and VA same passing rate
Algebra I	APS exceeded VA passing rate
Geometry	APS and VA same passing rate
Algebra II	APS and VA same passing rate

Next this report provides secondary SOL results, by groups of students. Figures 39-44focus on SOL results by race and Hispanic origin, with results from 2004–05 through 2009–10. The achievement gap is calculated by comparing the passing rate for Asian, black, or Hispanic students to the passing rate for white students.

Secondary SOLs by Race, Hispanic Origin

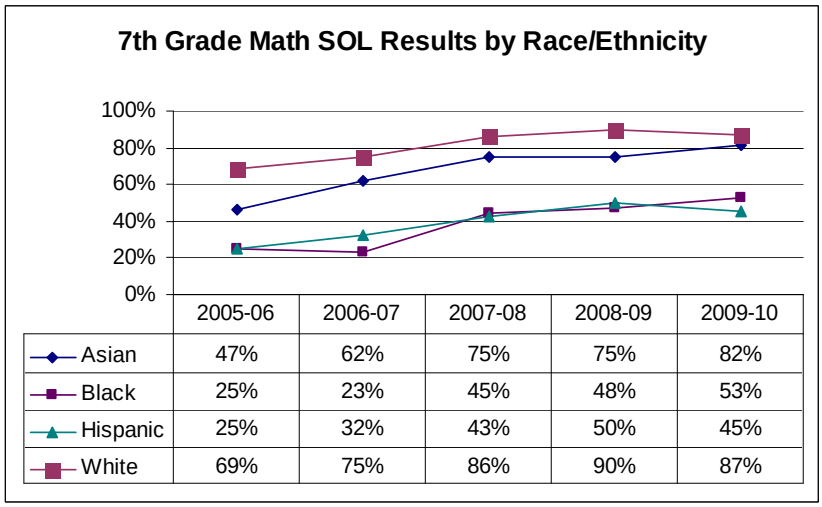
Figure 39. Grade 6 Mathematics SOL Results by Race and Ethnic Origin, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	34%	62%	59%	69%	70%
Black	14%	34%	26%	50%	47%
Hispanic	20%	32%	37%	41%	47%
White	52%	75%	72%	76%	86%

There is a relatively steady gap in performance by students on the Grade 6 SOL math test (Figure 39). White students have the highest passing rate, although the passing rates for black and Hispanic students, having increased over time, are unacceptably low at 47 percent.

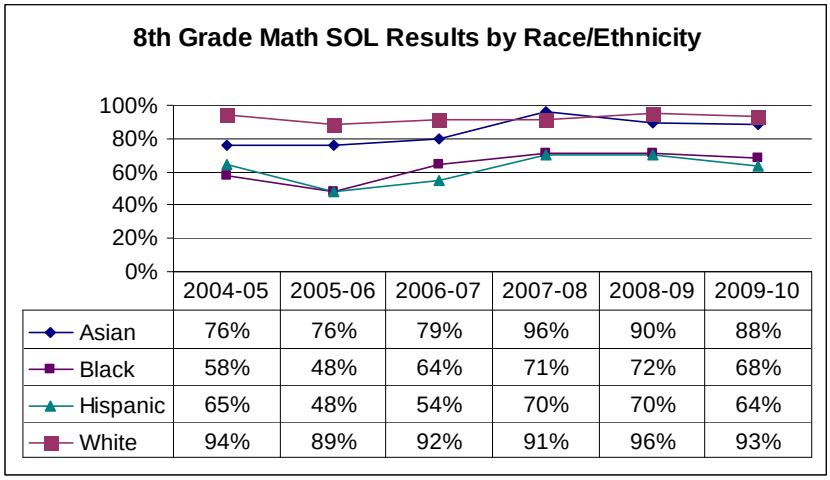
Figure 40. Grade 7 Mathematics SOL Results by Race and Ethnic Origin, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	47%	62%	75%	75%	82%
Black	25%	23%	45%	48%	53%
Hispanic	25%	32%	43%	50%	45%
White	69%	75%	86%	90%	87%

The passing rates on the Grade 7 mathematics SOL tests show consistent increases in performance by all groups, but the passing rates are still low overall, particularly for black and Hispanic students (Figure 40).

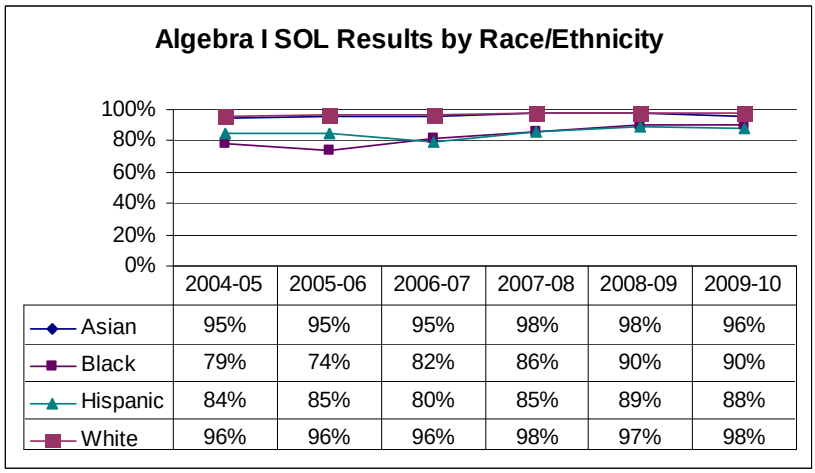
Figure 41. Grade 8 Mathematics SOL Results by Race and Ethnic Origin, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	76%	76%	79%	96%	90%	88%
Black	58%	48%	64%	71%	72%	68%
Hispanic	65%	48%	54%	70%	70%	64%
White	94%	89%	92%	91%	96%	93%

The Grade 8 mathematics SOL results show steady gaps in performance, with about two thirds of the black and Hispanic students meeting the proficiency expectations (Figure 41).

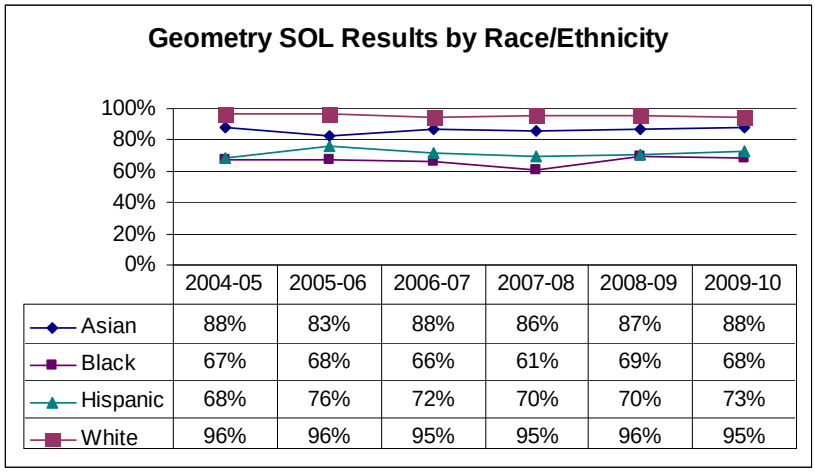
Figure 42. Algebra I Mathematics SOL Results by Race and Ethnic Origin, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	95%	95%	95%	98%	98%	96%
Black	79%	74%	82%	86%	90%	90%
Hispanic	84%	85%	80%	85%	89%	88%
White	96%	96%	96%	98%	97%	98%

Algebra I SOL results are reported for all students, regardless of the grades in which they completed the assessments (Figure 42). Black students have shown steady improvement, and, although passing rates have fluctuated, there is a suggestion of improved performance among Hispanic students.

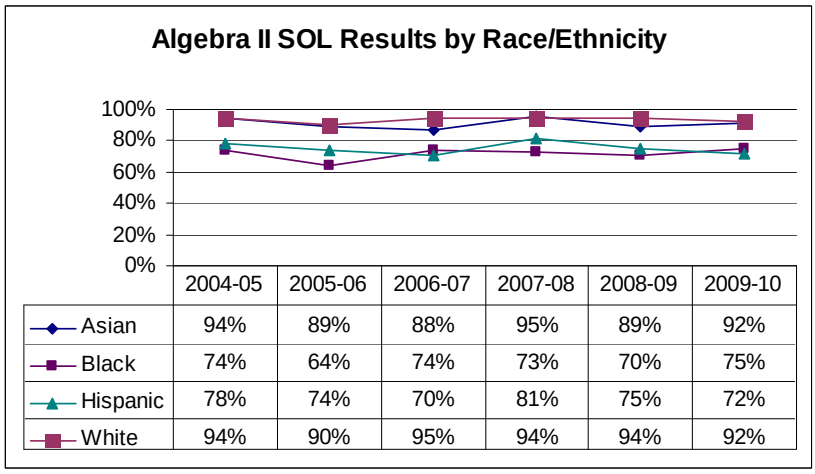
Figure 43. Geometry SOL Results by Race and Ethnic Origin, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	88%	83%	88%	86%	87%	88%
Black	67%	68%	66%	61%	69%	68%
Hispanic	68%	76%	72%	70%	70%	73%
White	96%	96%	95%	95%	96%	95%

Passing rates on the Geometry SOL remain flat, with small gains made by black and Hispanic students, although they still lag behind the passing rates of Asian and white students (Figure 43).

Figure 44. Algebra II SOL Results by Race and Ethnic Origin, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	94%	89%	88%	95%	89%	92%
Black	74%	64%	74%	73%	70%	75%
Hispanic	78%	74%	70%	81%	75%	72%
White	94%	90%	95%	94%	94%	92%

Performance on the Algebra II assessment shows the passing rate decreasing from 2004–05 to 2009–10 for all groups except black students (Figure 44). Asian and white students passed at 92 percent, compared to passing rates in the low- to mid-70 percent range for black and Hispanic students. There has been steady improvement for both black and Hispanic students during all but one year.

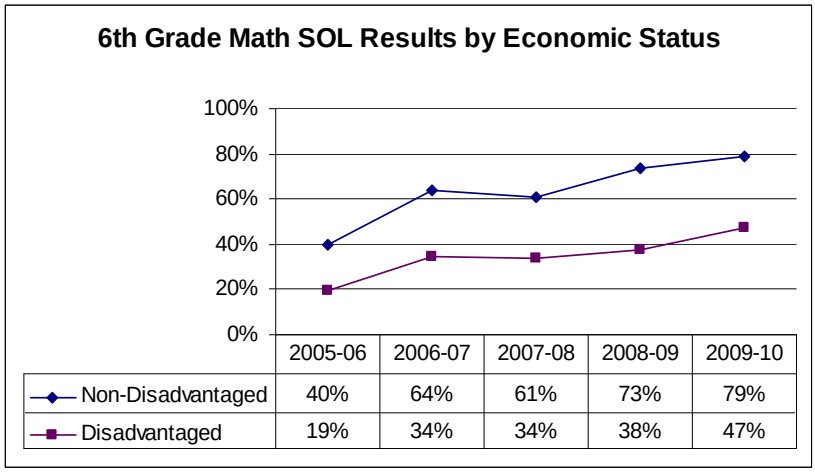
Secondary SOLs by Gender

Secondary SOL results were examined by gender. There were no notable differences in performance, so that information was not included in this report. It is available in Appendix F.

Secondary SOLs by Economic Status

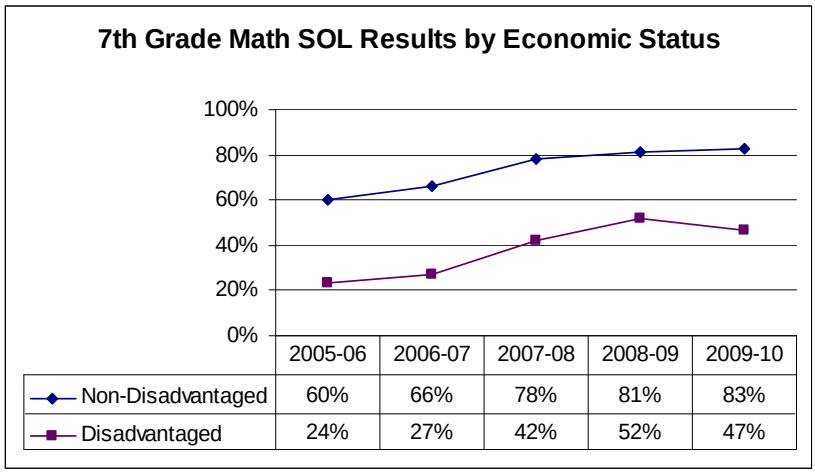
Figures 45 through 50 focus on SOL results by economic status, with results from 2004–05 through 2009–10. Students receiving free or reduced cost lunch are identified as disadvantaged, and the remainder of students is identified as non-disadvantaged. The achievement gap is calculated by comparing the passing rate for disadvantaged students to non-disadvantaged students.

Figure 45. Grade 6 Mathematics SOL Results by Economic Status, 2004-05 to 2009-10



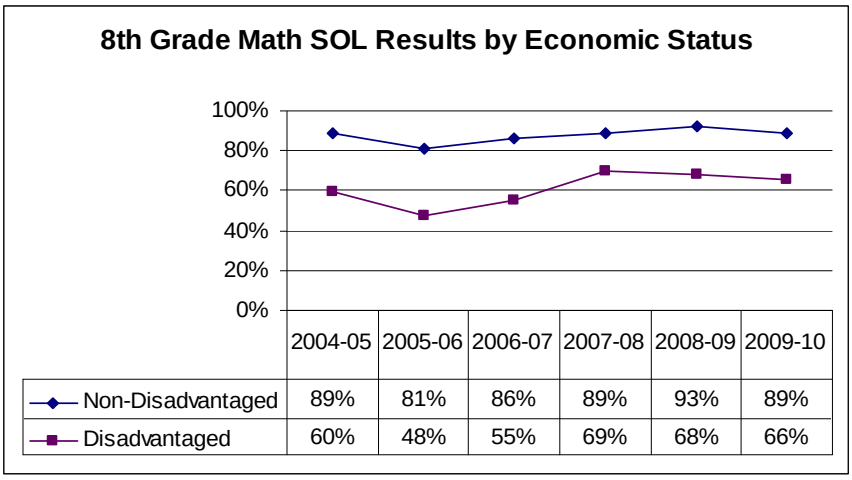
Fewer than half of the students identified as disadvantaged passed the Grade 6 SOL assessments all five years, and the gap between groups has widened from 21 percentage points to 32 percentage points (Figure 45).

Figure 46. Grade 7 Mathematics SOL Results by Economic Status, 2004-05 to 2009-10



The gap between economically disadvantaged students and other students remains fairly constant at 36 percentage points (Figure 46). The passing rate has increased for both groups, but it remains unacceptably low, particularly for disadvantaged students.

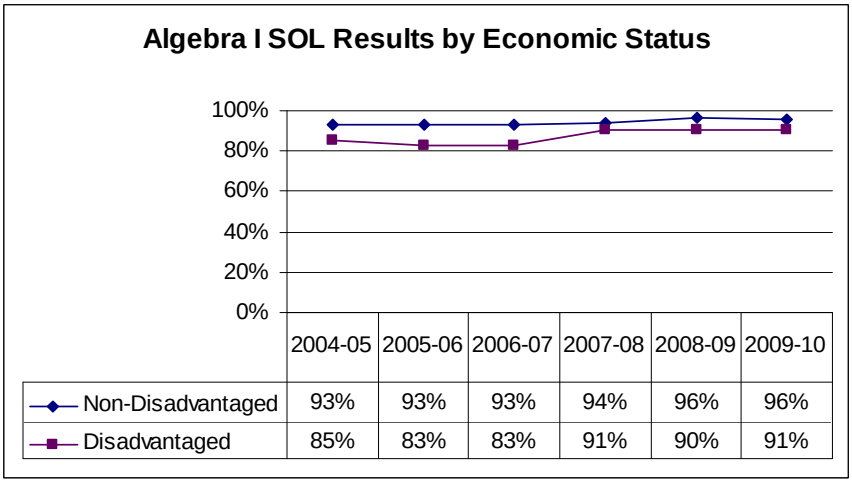
Figure 47. Grade 8 Mathematics SOL Results by Economic Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	89%	81%	86%	89%	93%	89%
Disadvantaged	60%	48%	55%	69%	68%	66%

The gap on the Grade 8 mathematics SOL assessment decreased by 6 percentage points, although the passing rate for disadvantaged students increased by 6 percentage points (Figure 47). Two out of three disadvantaged students met the proficiency requirements.

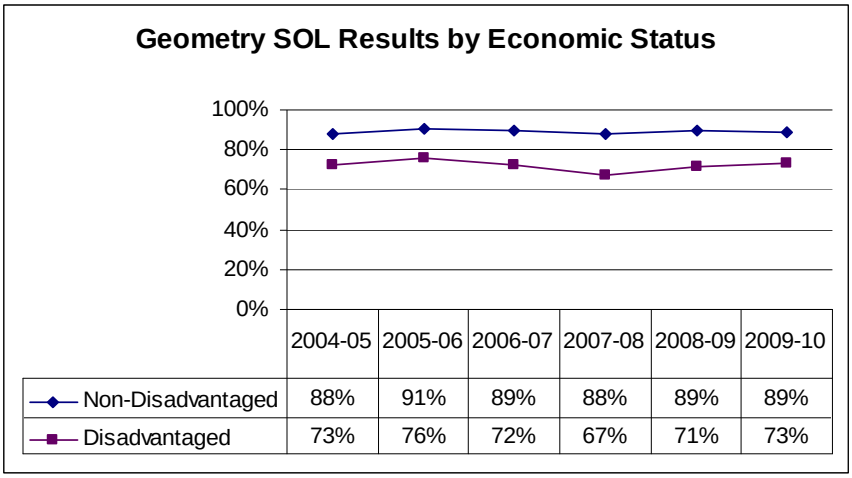
Figure 48. Algebra I SOL Results by Economic Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	93%	93%	93%	94%	96%	96%
Disadvantaged	85%	83%	83%	91%	90%	91%

Passing rates on the Algebra I SOL assessment are relatively high for economically disadvantaged students and the comparison group (Figure 48). At the same time, the passing rate has increased for both groups.

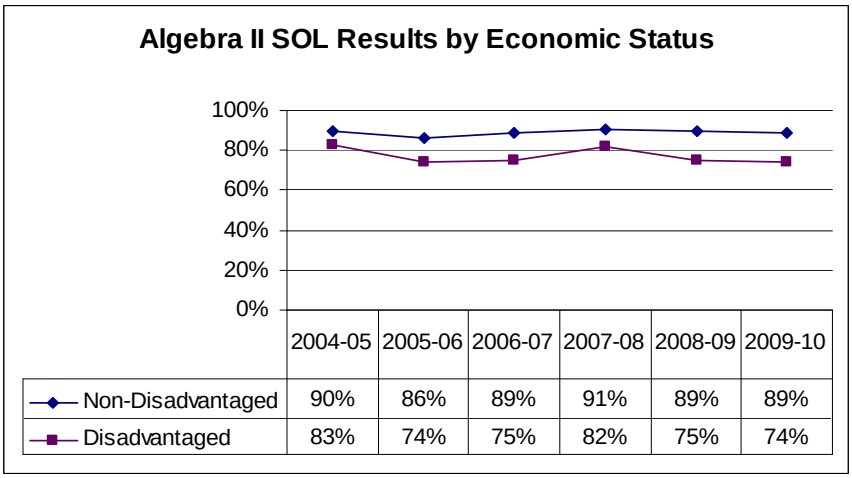
Figure 49. Geometry SOL Results by Economic Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	88%	91%	89%	88%	89%	89%
Disadvantaged	73%	76%	72%	67%	71%	73%

Performance on the Geometry SOL remained flat for both groups, and with small exceptions, the gap between the groups' passing rates remains constant (Figure 49).

Figure 50. Algebra II SOL Results by Economic Status, 2004-05 to 2009-10



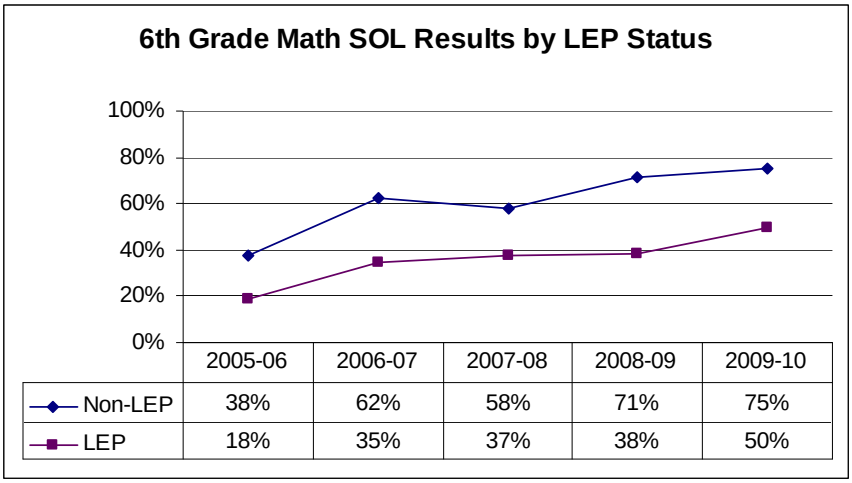
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	90%	86%	89%	91%	89%	89%
Disadvantaged	83%	74%	75%	82%	75%	74%

Passing rates on the Algebra II end-of-course SOL exam decreased for both groups, but the decrease was greater for economically disadvantaged students, and during the time period, the gap between the groups doubled (Figure 50).

Secondary SOLs by LEP Status

Next we look at the SOL results of LEP students, with results from 2004–05 through 2009–10. In calculating the gap, the passing rate for LEP students is compared to the passing rate for non-LEP students.

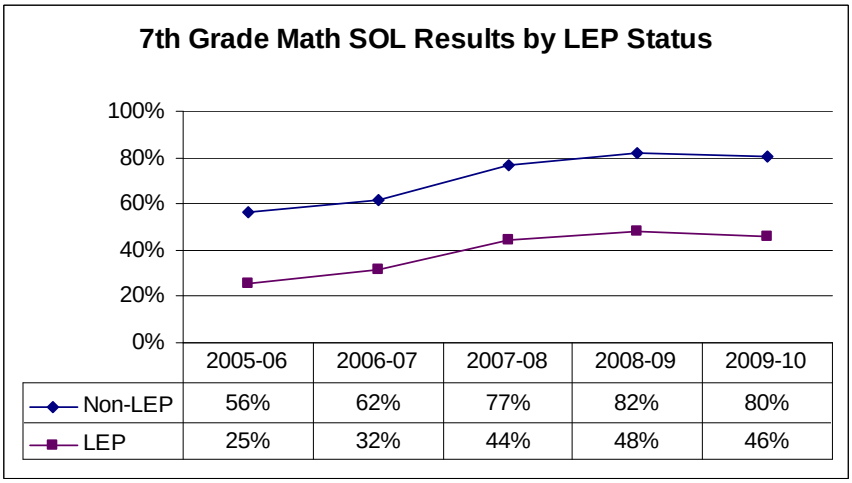
Figure 51. Grade 6 Mathematics SOL Results by LEP Status, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	38%	62%	58%	71%	75%
LEP	18%	35%	37%	38%	50%

The passing rate on the Grade 6 SOL test shows gaps exceeding 30 percentage points for LEP students compared with non-LEP students (Figure 51). One in two LEP students did not pass the test in 2009–10.

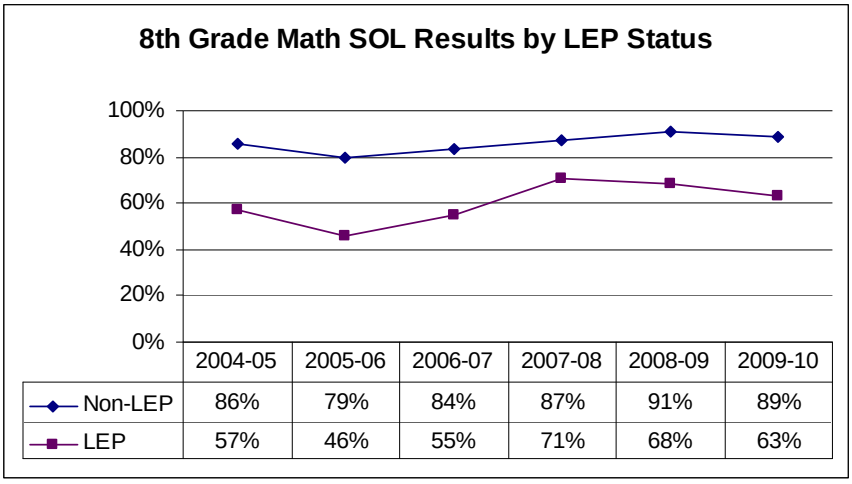
Figure 52. Grade 7 Mathematics SOL Results by LEP Status, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	56%	62%	77%	82%	80%
LEP	25%	32%	44%	48%	46%

Fewer than one in two LEP students passed the Grade 7 mathematics SOL exam all five years (Figure 52). The passing rate on the exam has increased for both groups over time, but the rate is still unacceptably low.

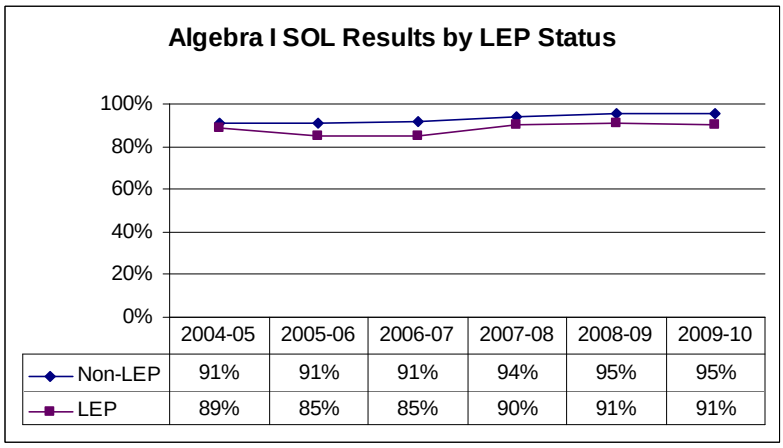
Figure 53. Grade 8 Mathematics SOL Results by LEP Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	86%	79%	84%	87%	91%	89%
LEP	57%	46%	55%	71%	68%	63%

Passing rates on the Grade 8 mathematics SOL test are relatively high for non-LEP students, at 89 percent, but lag for LEP students, with variation in performance over time (Figure 53).

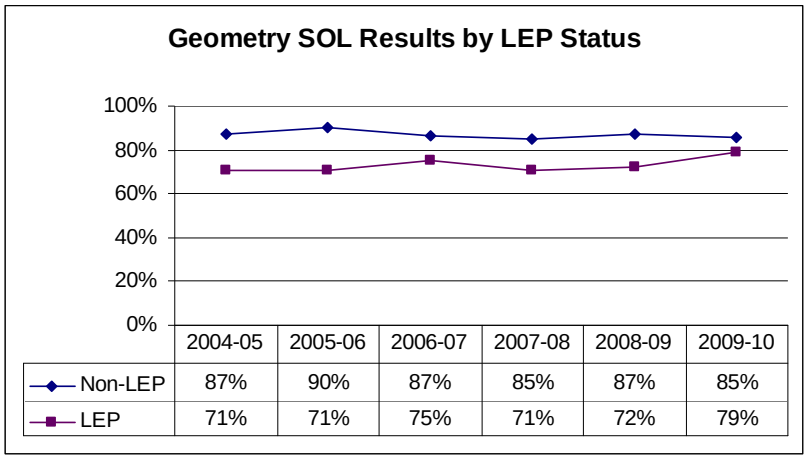
Figure 54. Algebra I SOL Results by LEP Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	91%	91%	91%	94%	95%	95%
LEP	89%	85%	85%	90%	91%	91%

Passing rates on the Algebra I SOL test are high for both LEP and non-LEP students, and there is only a 4-percentage point gap in the most recent year of reporting (Figure 54).

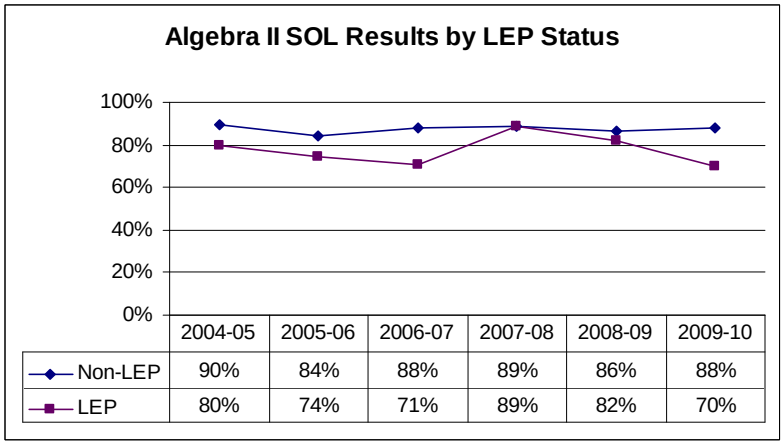
Figure 55. Geometry SOL Results by LEP Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	87%	90%	87%	85%	87%	85%
LEP	71%	71%	75%	71%	72%	79%

Performance on the Geometry SOL test shows a slight decrease (2 percentage points) in the passing rate for non-LEP students and an increased passing rate for LEP students (Figure 55). LEP passing rates are not consistent.

Figure 56. Algebra II SOL Results by LEP Status, 2004-05 to 2009-10



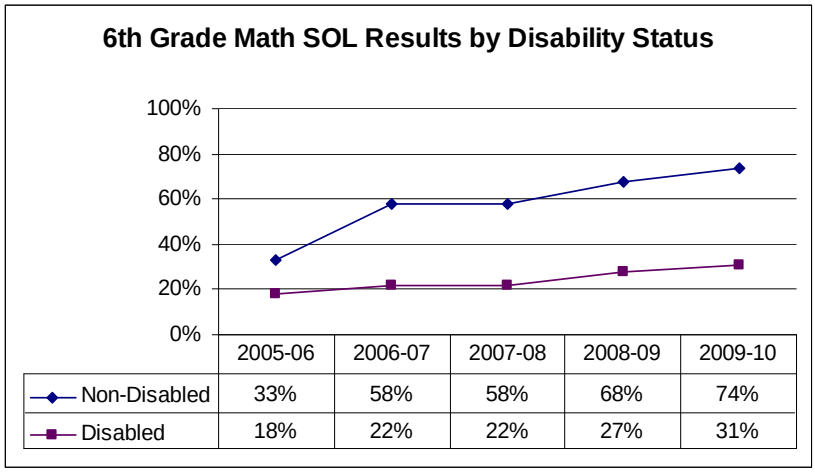
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	90%	84%	88%	89%	86%	88%
LEP	80%	74%	71%	89%	82%	70%

The passing rate on the Algebra II end-of-course SOL exam has decreased over time (Figure 56). The decrease is greater for LEP students; for this group, the level has fluctuated, so it is difficult to identify patterns in performance.

Secondary SOLs by Students Identified with a Disability

For the final examination of secondary SOL results, disabled students are in one group and nondisabled students are in another group, with results from 2004–05 through 2009–10. The passing rate for disabled students is compared to the passing rate for nondisabled students when we calculate the gap.

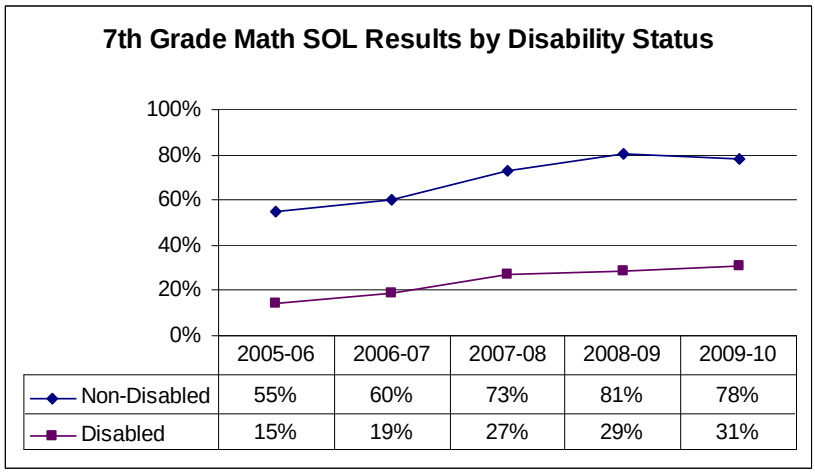
Figure 57. Grade 6 Mathematics SOL Results by Disability Status, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	33%	58%	58%	68%	74%
Disabled	18%	22%	22%	27%	31%

On the Grade 6 mathematics SOL test, less than one in three students with disabilities passed the test each of the past five years (Figure 57). The passing rate has more than doubled for nondisabled students, and increased by 13 percentage points for disabled students, but it remains unacceptably low.

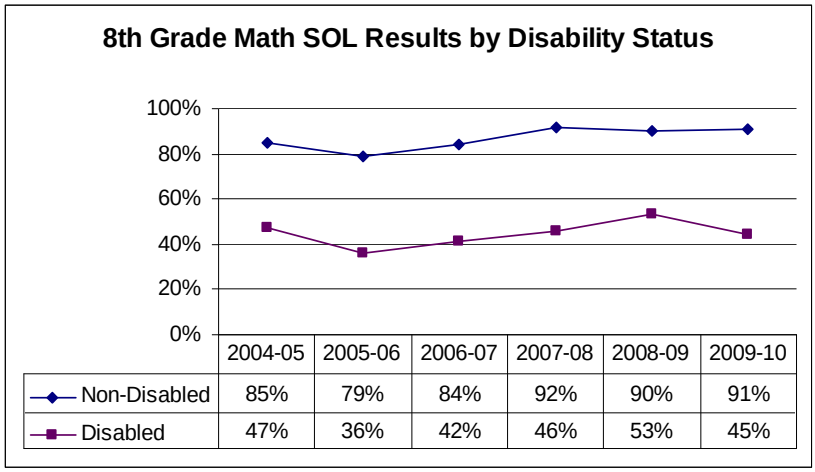
Figure 58. Grade 7 Mathematics SOL Results by Disability Status, 2004-05 to 2009-10



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	55%	60%	73%	81%	78%
Disabled	15%	19%	27%	29%	31%

The passing rates for students with disabilities are unacceptably low (Figure 58). Although the passing rate has doubled for this group, fewer than one of every three students identified with disabilities met the proficiency expectations each year.

Figure 59. Grade 8 Mathematics SOL Results by Disability Status, 2004-05 to 2009-10

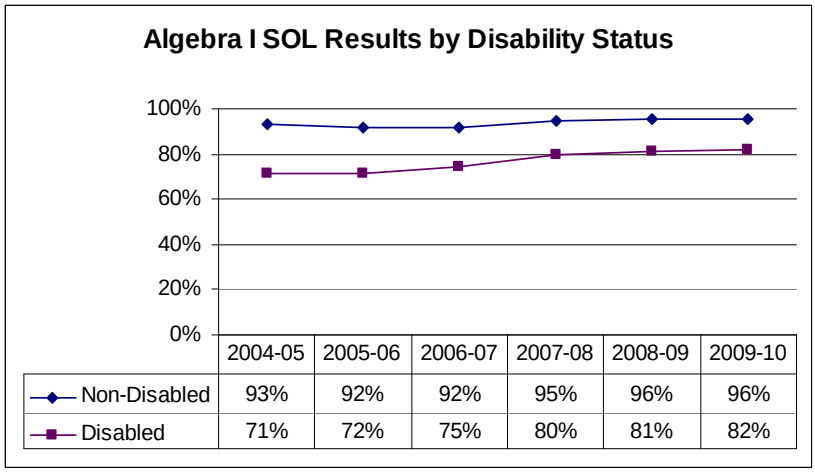


	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	85%	79%	84%	92%	90%	91%
Disabled	47%	36%	42%	46%	53%	45%

On the Grade 8 mathematics SOL assessment, performance by students identified with disabilities has fluctuated and decreased over time, although at the same time there has been a relatively stable improvement in the scores for non-disabled students (Figure 59).

In 2009–10, fewer than half of the disabled students passed the Grade 8 SOL exam.

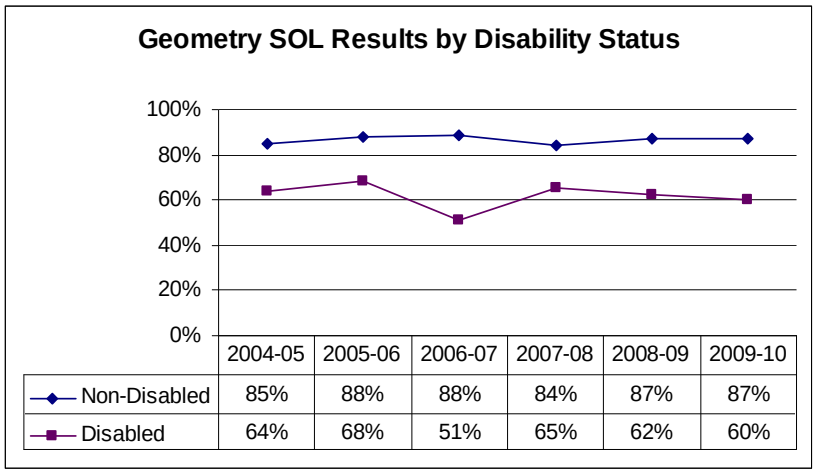
Figure 60. Algebra I SOL Results by Disability Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	93%	92%	92%	95%	96%	96%
Disabled	71%	72%	75%	80%	81%	82%

Performance on the Algebra I SOL exam shows a notable improvement in the passing rates for disabled students of 11 percentage points (Figure 60).

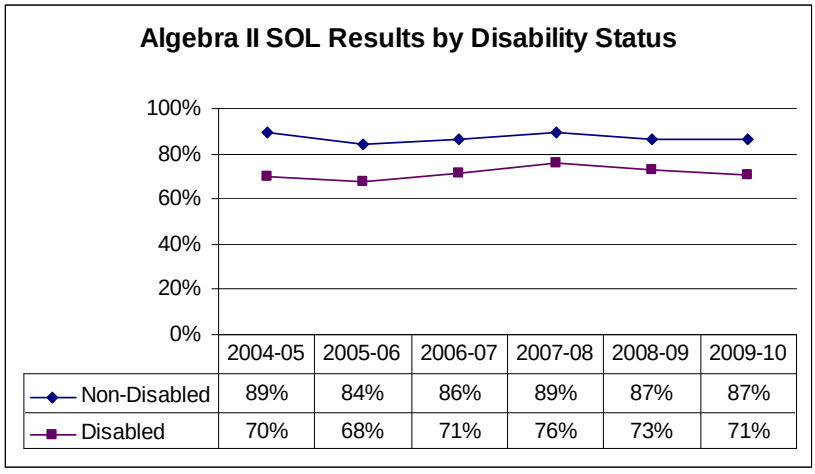
Figure 61. Geometry SOL Results by Disability Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	85%	88%	88%	84%	87%	87%
Disabled	64%	68%	51%	65%	62%	60%

Approximately three in five disabled students passed the Geometry end-of-course SOL exam, compared to 87 percent of the nondisabled students in 2009–10 (Figure 61). During the time reported, passing rates have fluctuated, and the passing rate is lower than it was in 2004–05.

Figure 62. Algebra II SOL Results by Disability Status, 2004-05 to 2009-10



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	89%	84%	86%	89%	87%	87%
Disabled	70%	68%	71%	76%	73%	71%

Passing rates on the Algebra II end-of-course SOL test follow similar patterns for both groups, with a gap that has reduced slightly over time (Figure 62).

All students tested on the identified SOL assessment are identified by a single identification in Figure 39 through Figure 62. Table 22 provides an alternative method of looking at mathematics SOL results. Each student is categorized into one combined category that shows race or Hispanic origin, economic status, and identifications for special education and LEP services. Table 22 shows results for the Class of 2012 across a five-year period, regardless of the assessment taken. Similar tables looking at performance by test over time are in found Appendix H.

Table 22. All Mathematics SOL Results for the Class of 2012 by Identified AYP categories, from Grade 6 (2005-06) to Grade 10 (2009-10)

Identified Categories	Grade 6 2005-06 Tested	Grade 6 2005-06 % Passing	Grade 7 2006-07 Tested	Grade 7 2006-07 % Passing	Grade 8 2007-08 Tested	Grade 8 2007-08 % Passing	Grade 9 2008-09 Tested	Grade 9 2008-09 % Passing	Grade 10 2009-10 Tested	Grade 10 2009-10 % Passing
Asian	38	87%	41	93%	50	100%	63	100%	55	96%
Asian, EconDis	12	67%	15	73%	13	100%	21	100%	21	95%
Asian, EconDis, LEP	53	47%	44	66%	42	98%	36	97%	36	92%
Asian, EconDis, SPED, LEP	4	0%	*		*					
Asian, LEP	23	48%	26	65%	28	100%	23	100%	21	86%
Asian, SPED	*		*		*		*		*	
Asian, SPED, LEP	*		3	33%	3	67%			2	100%
Black	74	45%	74	46%	75	92%	65	95%	82	82%
Black, EconDis	62	26%	51	37%	48	94%	43	93%	44	75%
Black, EconDis, LEP	9	11%	10	20%	12	67%	7	71%	8	100%
Black, EconDis, SPED	29	3%	26	0%	27	41%	4	75%	18	83%
Black, EconDis, Sped, LEP	*		*		*				*	
Black, LEP	*		3	0%	4	50%	3	67%	5	80%
Black, SPED	24	4%	26	4%	22	36%	*		17	76%
Black, SPED, LEP	*		*							
Hispanic	33	79%	45	87%	62	98%	64	95%	88	89%
Hispanic, EconDis	24	54%	36	69%	42	98%	47	98%	68	84%
Hispanic, EconDis, LEP	172	31%	135	25%	114	73%	82	91%	75	80%
Hispanic, EconDis, SPED	7	0%	6	17%	7	43%	4	100%	18	61%
Hispanic, EconDis, SPED, LEP	58	10%	52	12%	53	36%	8	75%	17	88%
Hispanic, LEP	41	41%	36	44%	39	82%	17	100%	20	70%
Hispanic, SPED	7	43%	6	33%	7	71%	8	100%	13	85%
Hispanic, SPED, LEP	10	20%	7	14%	14	50%	*		*	
Other (or MultipleRace)	5	60%	4	50%	5	100%	4	100%	5	80%
Other (or MultipleRace), EconDis	*		*						*	
Other (or MultipleRace), EconDis, SPED							*		*	
White	478	86%	474	93%	491	99%	488	99%	376	97%
White, EconDis	20	65%	13	69%	10	90%	10	80%	15	87%
White, EconDis, LEP	8	13%	10	20%	7	71%	*		11	100%
White, EconDis, SPED	4	25%	8	13%	4	50%	*		5	20%
White, EconDis, SPED, LEP	3	33%	*		*					
White, LEP	12	58%	11	73%	15	93%	10	100%	*	
White, SPED	72	54%	58	47%	65	75%	39	87%	60	90%
White, SPED, LEP	4	50%	4	25%	*		*		*	
Total	1296	56%	1233	62%	1268	87%	1056	96%	1089	89%

*Results are not reported for groups of fewer than 3 students

Among the anticipated Class of 2012, the passing rate was lower than 75 percent on at least three of the SOL assessments[10] for the following:

- Black students identified with a disability (regardless of identification as economically disadvantaged)
- Hispanic students identified as LEP (regardless of identification as economically disadvantaged)
- Hispanic students dually identified as LEP and identified with a disability

[10] For an identified category of students to be highlighted in this analysis, at least ten students must have been tested across at least four of the five years reported.

Table 23 shows the number of times the passing rate was lower than 75 percent on at least three of the mathematics SOL assessments during a five-year period.[11] The last column shows the total number of assessments where the passing rate fell below 75 percent for the identified groups of students.

Table 23. Count of Times Mathematics SOL Passing Rates Fell Below 75%, by Assessment, Class, and Identified AYP categories, 2005-06 through 2009-10.

SOL Analysis Count of times the passing rate fell below 75%	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Algebra I	Geometry	Algebra II	Sum of Times the Passing Rate Fell Below 75%
Identified Categories										
Asian										0
Asian, EconDis										0
Asian, EconDis, LEP				5	4					9
Asian, EconDis, SPED, LEP										0
Asian, LEP				4	5					9
Asian, SPED										0
Asian, SPED, LEP										0
Black				5	5					10
Black, EconDis		4		5	5			4	3	21
Black, EconDis, LEP				4	5	3		3		15
Black, EconDis, SPED	4	5	5	5	5	5	4	5		38
Black, EconDis, SPED, LEP										0
Black, LEP										0
Black, SPED		5		5	5	5	4	5		29
Black, SPED, LEP										0
Hispanic				3						3
Hispanic, EconDis				4	4					8
Hispanic, EconDis, LEP		4		5	5	5		3	3	25
Hispanic, EconDis, SPED							3	5		8
Hispanic, EconDis, SPED, LEP	5	5	5	5	5	5				30
Hispanic, LEP				5	5			5	4	19
Hispanic, SPED								3		3
Hispanic, SPED, LEP	4									4
White										0
White, EconDis										0
White, EconDis, LEP		4								4
White, EconDis, SPED										0
White, EconDis, SPED, LEP										0
White, LEP				4						4
White, SPED				5	5	4				14
White, SPED, LEP										0
Other (or MultipleRace)										0
Other (or MultipleRace), EconDis										0
Other (or MultipleRace), EconDis, SPED										0
Total				5	5					10

[11] For an identified category of students to be highlighted in this analysis, at least ten students must have been tested across at least four of the five years reported.

Table 24. Rank Order of the Sum of Times Various AYP Identification Categories Fell Below the 75% Passing Rate on Mathematics SOL Passing Rates That Fell Below 75% from 2005-06 through 2009-10.

SOL Analysis Count of times the passing rate fell below 75%	Sum of Times the Passing Rate Fell Below 75%
Identified Categories	
Black, EconDis, SPED	38
Hispanic, EconDis, SPED, LEP	30
Black, SPED	29
Hispanic, EconDis, LEP	25
Black, EconDis	21
Hispanic, LEP	19
Black, EconDis, LEP	15
White, SPED	14
Black	10
Total	10
Asian, EconDis, LEP	9
Asian, LEP	9
Hispanic, EconDis	8
Hispanic, EconDis, SPED	8
Hispanic, SPED, LEP	4
White, EconDis, LEP	4
White, LEP	4
Hispanic	3
Hispanic, SPED	3

Table 24 shows the number of times during the five-year period when the passing rate on mathematics SOL assessments fell below 75 percent for AYP groups. These times are sorted in order from highest number of times to the lowest. Black and Hispanic students with additional identifications make up the majority of the low passing rates on SOL assessments.

The data provided for this analysis is extensive and could be an alternative way of looking at student outcomes, but the information is summative, so as we look at reporting, the priority should focus on formative results that can inform practices to help students rather than after-the-fact results that inform practices at a global level.

Stanford 10

The Stanford 10 achievement test measures a student's achievement or broad content knowledge of a core curriculum. At one time the test was required across Virginia, but with the increasing requirements for SOL testing, this mandate was dropped. APS has continued to administer the Stanford 10 to students in Grades 4 and 6 because it provides an early indicator of APS performance against students across the United States.

This study looks at results of the mathematics portion of the Stanford 10, using percentile results to assess APS performance. The percentile ranks indicate the percentage of students in the national sample who scored lower than the average for Arlington students.

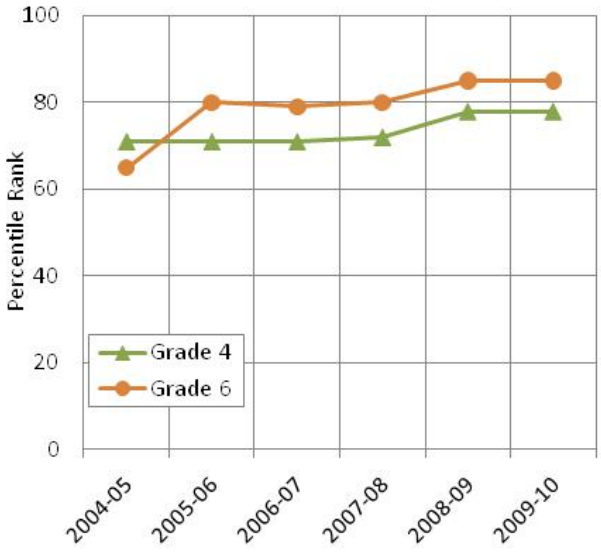
Table 25 and Figure 63 show that Stanford 10 percentile ranks in mathematics have increased for Grade 4 and Grade 6 on the mathematics assessment. Between fall 2004 and fall 2009, the percentile rank for Grade 4 has increased 7 points to 78. During the same time frame, the Grade 6 percentile rank increased 20 points to 85. The steady increase for both groups is most likely

related to the county's efforts to accelerate mathematics proficiency at earlier ages in order to prepare students for a successful experience in Algebra by Grade 8.

Table 25. APS Stanford 10 Percentile Ranks, Grades 4 and 6, 2004-05 through 2009-10

School Year	Grade 4		Grade 6	
	Tested	Percentile Rank	Tested	Percentile Rank
2009-10	1307	78	1232	85
2008-09	1313	78	1247	85
2007-08	1217	72	1188	80
2006-07	1219	71	1154	79
2005-06	1159	71	1169	80
2004-05	1276	71	1193	65

Figure 63. Stanford 10 Percentile Ranks, Grades 4 and 6, 2004-05 through 2009-10



When the Stanford 10 results are examined by race or Hispanic origin, different patterns emerge (Figure 65). Across Grade 4, the percentile ranks for white students have fluctuated around 85, decreasing from a high of 88 in 2004–05, although percentile ranks increased 11 points for Asian and black students and 17 points for Hispanic students.

Across Grade 6, the percentile ranks increased for all student groups— 10 points for white students, 18 points for black students, 23 points for Hispanic students, and 29 points for Asian students (Figure 64).

During the same time frame, the gaps have decreased but still remain. The gaps at Grade 4 decreased by 14 points to a 26-percentage-point gap between black and white students and 20 points to a 21-percentage-point gap between Hispanic and white students. The gaps at Grade 6 decreased by 8 points to a 29-percentage-point gap between black and white students and13 points to a 25-percentage-point gap between Hispanic and white students.

Figure 65. Stanford 10 Percentile Ranks for Students in Grade 4 by Race, Ethnic Origin

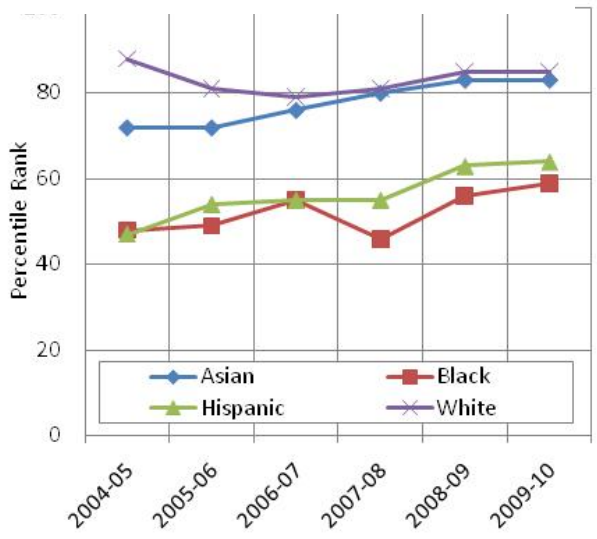
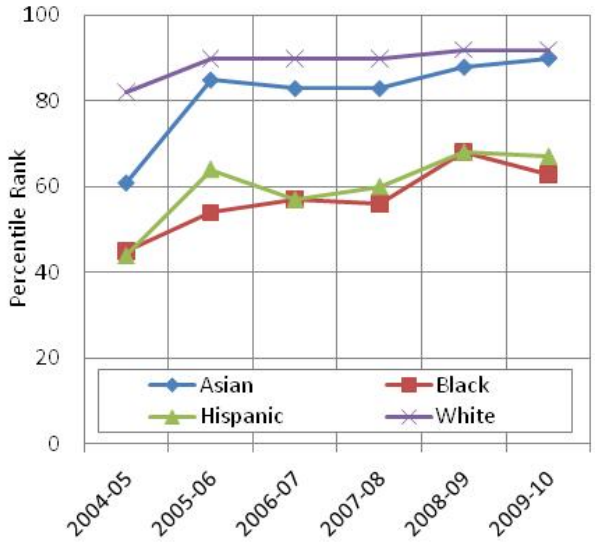


Figure 64. Stanford 10 Percentile Ranks for Students in Grade 6 by Race, Ethnic Origin



Across Grades 4 and 6, there was no real difference in the performance by gender, and the results look similar to the overall performance of APS students.

Performance by economic status shows the percentile rate increasing for all students but rising at a faster pace for economically disadvantaged students.

Figure 66. Stanford 10 Percentile Ranks for Students in Grade 4 by Economic Status

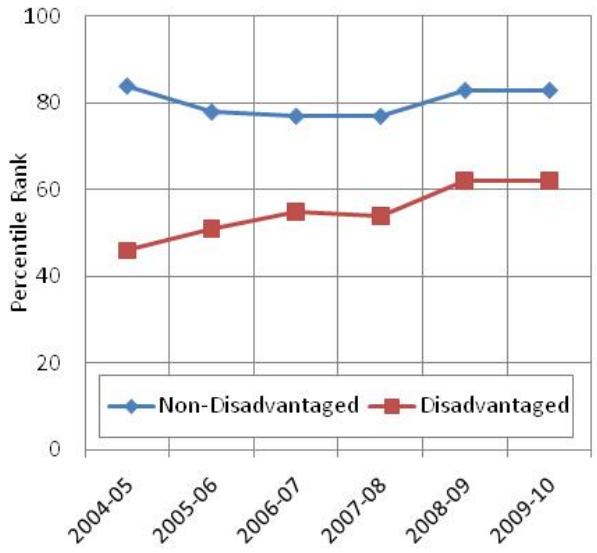


Figure 67. Stanford 10 Percentile Ranks for Students in Grade 6 by Economic Status

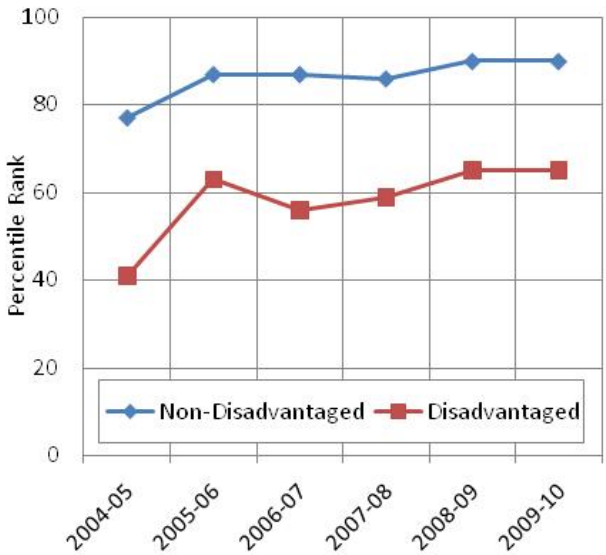


Figure 66. Stanford 10 Percentile Ranks for Students in Grade 4 by Economic Status

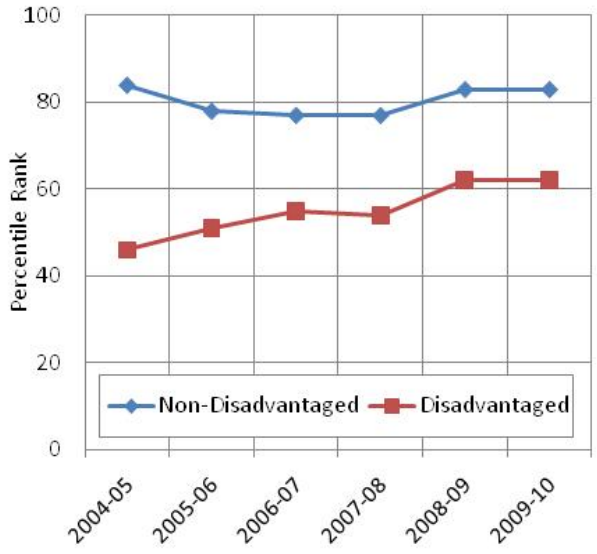
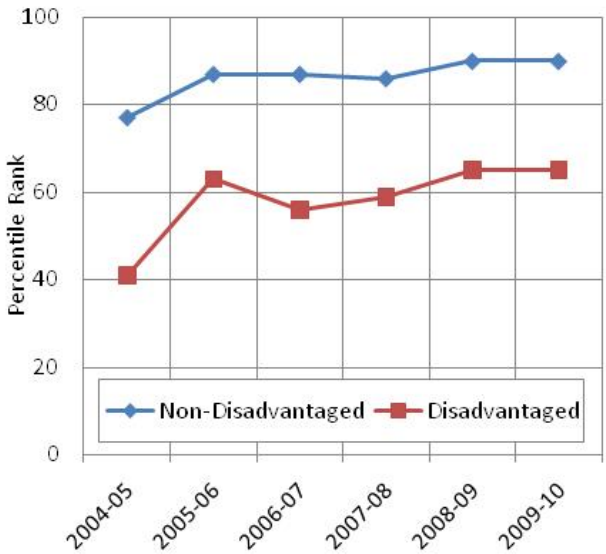


Figure 67. Stanford 10 Percentile Ranks for Students in Grade 6 by Economic Status



The results by LEP status show the percentile rate increasing for all students but rising at a faster pace for LEP students (Figure 68 and Figure 69. For LEP students, the percentile rank at Grade 4 increased by 17 points to 67 and at Grade 6 by 28 points to 69.

Figure 68. Stanford 10 Percentile Ranks for Students in Grade 4 by LEP Status

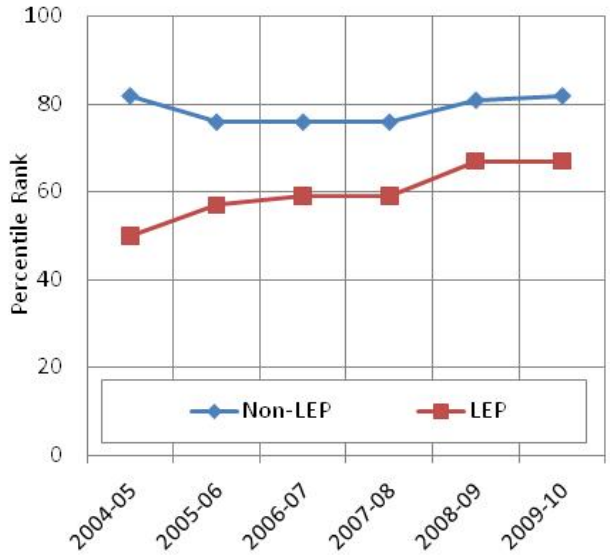
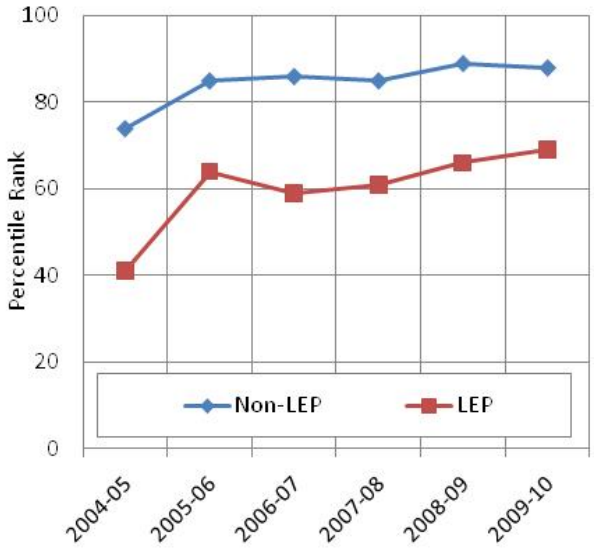


Figure 69. Stanford 10 Percentile Ranks for Students in Grade 6 by LEP Status



In contrast to the other groups, there has been limited progress by students with disabilities (Figure 70 and Figure 71). For students with disabilities, the percentile rank at Grade 4 increased by 4 points to 54 and at Grade 6 increased by 6 points to 47.

Figure 70. Stanford 10 Percentile Ranks for Students in Grade 4 by Identification with a Disability

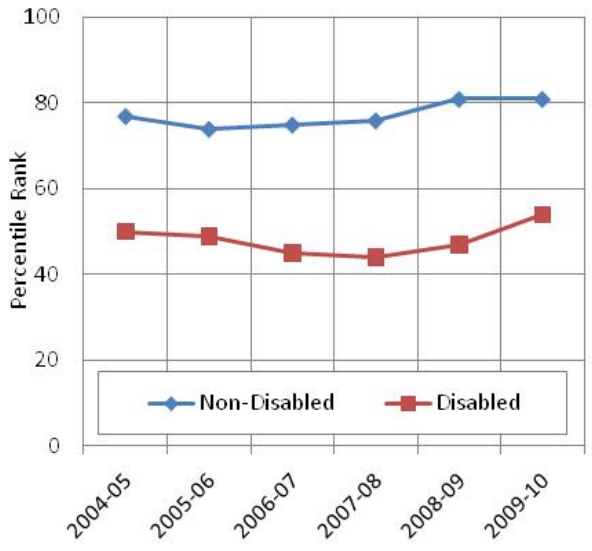


Figure 71. Stanford 10 Percentile Ranks for Students in Grade 6 by Identification with a Disability

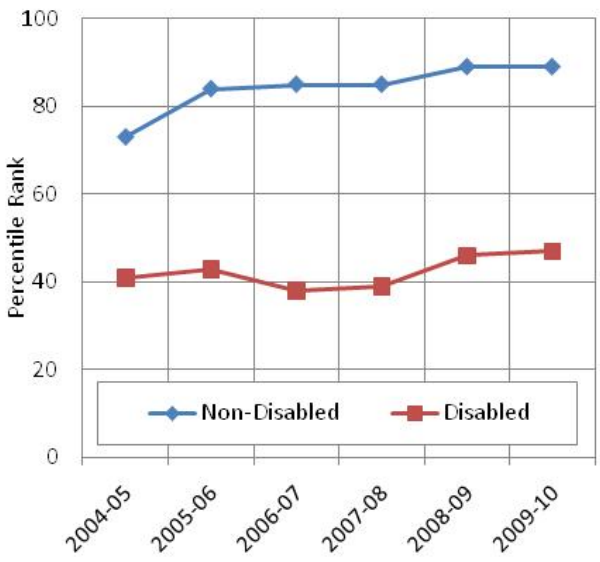


Table 26. Stanford 10 Participation Rates by Students Identified with a Disability.

Disability Status	School Year	Grade 4 No. Tested	Grade 6 No. Tested
Non-Disabled	2009-10	1132	1051
	2008-09	1142	1056
	2007-08	1030	996
	2006-07	1033	939
	2005-06	1002	1011
	2004-05	986	866
Disabled	2009-10	175	181
	2008-09	171	191
	2007-08	187	192
	2006-07	185	206
	2005-06	148	149
	2004-05	290	327

The small increases in the percentile rate have occurred as the number of students identified with disabilities decreased by more than 40 percent (Table 26).

AP and IB Exams

APS encourages student to take AP and IB courses. Students enrolled in these courses earn grades for the courses, and they are required to take the corresponding exams. Through the exams, students have the benefit of qualifying for college credit. APS covers the test fees for students enrolled in the classes.

AP exams are developed by the College Board and measure student achievement on skills and subject content outlined in the course description for each course. AP mathematics courses offered to APS students include Calculus AB, Calculus BC, and Statistics. The AP exams are scored by The College Board on a scale ranging from 1 (no recommendation) to 4 (extremely well-qualified). The College Board recommends that when a student scores a 3 or greater, referred to as a "qualifying score," the scores are considered to qualify for college credit or advanced placement at the university level.

Washington-Lee is an IB program, and two IB math courses are available, including IB math studies and IB mathematics. For each of these courses, students take exams that are developed by the IB organization and that measure student achievement on skills and subject content outlined in the course description. The IB organization scores the exams, and the grades awarded range from 1 (lowest) to 7 (highest). Scores of 4 or greater are considered "qualifying scores."

Table 27. Enrollment and Passing Rates in AP Mathematics Courses

Test	School Year	No. Tested	% Passing
Calculus AB	2009-10	172	63
	2008-09	202	63
	2007-08	136	60
	2006-07	113	63
	2005-06	136	54
	2004-05	108	48
Calculus BC	2009-10	115	78
	2008-09	125	82
	2007-08	72	78
	2006-07	92	82
	2005-06	63	79
	2004-05	68	75
Statistics	2009-10	133	60
	2008-09	98	59
	2007-08	89	63
	2006-07	98	58
	2005-06	75	55
	2004-05	75	51

Since 2004–05, the number of students enrolled and tested increased by 59 percent for Calculus AB, 59 percent for Calculus BC, and by 77 percent for Statistics.

Although the number of students participating in the AP assessment increased, the percentage of students passing the AP test increased across all three exams, ranging from a 3-percentage-point increase for Calculus BC to a 15-percentage-point increase for Calculus AB.

Table 28. Enrollment and Passing Rates in AP Mathematics Courses by Race, Hispanic Origin

		Calculus AB		Calculus BC		Statistics	
Race	School Year	No. Tested	% Passing	No. Tested	% Passing	No. Tested	% Passing
Asian	2009-10	27	52	20	75	21	48
	2008-09	27	59	17	88	14	43
	2007-08	18	39	15	80	7	71
	2006-07	10	50	14	79	11	45
	2005-06	13	31	8	100	6	67
	2004-05	9	56	18	67	10	80
Black	2009-10	5	20	4	50	7	43
	2008-09	10	30	6	33	7	29
	2007-08	9	44	2	50	9	22
	2006-07	*		2	50	7	14
	2005-06	6	33	2	50	3	0
	2004-05	6	50	*		*	
Hispanic	2009-10	12	50	13	69	20	30
	2008-09	29	31	5	80	5	60
	2007-08	11	64	5	40	5	20
	2006-07	4	25	4	25	11	18
	2005-06	8	25	*		5	20
	2004-05	17	18	8	75	10	30
White	2009-10	125	70	77	82	83	72
	2008-09	133	73	95	83	71	66
	2007-08	85	65	43	84	58	72
	2006-07	98	65	72	86	69	71
	2005-06	108	60	40	82	61	59
	2004-05	66	58	38	82	48	52
Other	2009-10	3	0	*		*	
	2008-09	3	67	*		*	
	2007-08	8	63	4	50	4	50
	2006-07	0	n/a	0	n/a	0	n/a
	2005-06	0	n/a	0	n/a	0	n/a
	2004-05	10	30	3	67	5	20

Table 28 shows that enrollment in AP Calculus AB doubled for white students, although remaining constant with small increases among other groups. Among the small number of student enrolled, the passing rates varied by group, and variations reflect the small numbers of students enrolled in the courses.

Enrollment patterns for AP Calculus BC were similar to AP Calculus AB. On this assessment, passing rates were high, but they reflect small numbers of students enrolled in the courses. In AP statistics, we see increased enrollment among white, Asian, and Hispanic students. As in other AP courses, enrollment for white students increases at higher rates that enrollment for other groups.

Passing rates on the AP Statistics assessment range from a low of 15 percent to a high of 80 percent; however, for most groups, this percentage reflects low enrollment. It is notable that although enrollment among white students has increased, the passing rate has also increased.

Table 29 shows enrollment and passing rates by gender, economic status, LEP status, and students with disabilities for the three AP mathematics courses. Enrollment has increased for most groups across all three courses with some variation, except for students identified with disabilities.

The passing rates have varied by groups. Because more males have taken the courses, the passing rate has decreased in both calculus courses and increased in statistics. For increasing numbers of females taking each course, the passing rate has increased in Calculus AB, although it has decreased in the other two courses. Among economically disadvantaged students, enrollment has increased, although passing rates fell for two of the three AP tests, and passing rates increased for non-disadvantaged students. Participation has increased for LEP and non-LEP students. Passing rates stayed constant or increased for non-LEP students, although they declined for LEP students. Enrollment among students identified with disabilities remains about the same, with three or fewer students participating.

Table 29. Enrollment and Passing Rates in AP Mathematics Courses by Gender, Economic Status, LEP Status, Identification with a Disability

	Calculus AB				Calculus BC				Statistics			
	2006-07	2007-08	2008-09	2009-10	2006-07	2007-08	2008-09	2009-10	2006-07	2007-08	2008-09	2009-10
Tested												
Female	59	62	99	94	42	39	58	50	50	45	52	74
Male	54	74	103	78	50	33	67	65	48	44	46	59
Non-Disadvantaged	125	107	167	160	56	81	113	98	71	86	91	116
Disadvantaged	10	6	35	12	7	11	12	17	4	12	7	17
Non-LEP	130	108	183	163	57	86	117	105	75	94	91	125
LEP	5	5	19	9	6	6	8	10	0	4	7	8
Non-Disabled	134	112	199	168	63	89	122	112	73	95	97	131
Disabled	1	1	3	2	0	3	3	3	2	3	1	2
% Passing												
Female	56	60	59	62	79	74	76	72	62	64	54	54
Male	70	59	67	64	84	82	87	83	54	61	65	68
Non-Disadvantaged	55	65	71	64	80	83	84	84	56	64	63	65
Disadvantaged	40	17	26	42	71	73	58	47	25	17	14	29
Non-LEP	54	64	66	64	79	80	83	79	55	60	59	62
LEP	60	40	32	44	83	100	63	70		25	57	25
Non-Disabled	54	63	63	63	79	81	82	78	55	59	59	60
Disabled	*	*	67	*	*	100	67	100	50	33	*	*

*Results are not reported for groups fewere than 3 students

Table 30. Enrollment and Passing Rates in IB Mathematic Courses

Test	School Year	No. Tested	% Passing
IB Math Studies	2009-10	36	97%
	2008-09	33	97%
	2007-08	27	93%
	2006-07	52	94%
	2005-06	31	94%
	2004-05	48	96%
IB Mathematics	2009-10	52	90%
	2008-09	47	77%
	2007-08	36	61%
	2006-07	32	88%
	2005-06	25	100%
	2004-05	31	94%

Since 2004–05, enrollment in IB math studies has decreased by 25 percent, although enrollment in IB mathematics has increased by 68 percent. Total enrollment in IB math offerings has risen slightly from 79 students in 2004–05 to 88 students in 2009–10. Math studies is a one-year course, although the IB mathematics exam is taken in the second of year of the two-year mathematics course offering.

The passing rate for IB math studies has remained constant, although the past rate for IB mathematics has fluctuated.

This report does not include IB math passing rates by most groups because the number of students in some groups was too small.

Table 31. Enrollment and Passing Rates in AP Mathematics Courses by Race, Hispanic Origin.

	IB Math Studies					IB Mathematics				
	2004-05	2005-06	2006-07	2008-09	2009-10	2004-05	2005-06	2006-07	2008-09	2009-10
Tested										
Asian	5	6	6	5	4	4	6	3	2	7
Black	4	3	1	3	5	0	3	2	2	1
Hispanic	6	3	8	6	5	0	1	2	5	6
White	33	19	37	19	22	27	15	25	36	37
Other						0	0	0	2	1
% Passing										
Asian	100%	83%	100%	100%	100%	100%	100%	67%	*	86%
Black	100%	67%	*	67%	100%	n/a	100%	*	*	*
Hispanic	83%	100%	75%	100%	80%	n/a	*	*	80%	83%
White	97%	100%	97%	100%	100%	93%	100%	88%	75%	92%
Other						n/a	n/a	n/a	*	*

*Results are not reported for groups fewere than 3 students

Table 32. Enrollment and Passing Rates in IB Mathematics Courses by Gender, Economic Status, LEP Status, Identification with a Disability

	IB Math Studies					IB Mathematics				
	2004-05	2005-06	2006-07	2008-09	2009-10	2004-05	2005-06	2006-07	2008-09	2009-10
Tested										
Female	31	26	36	26	19	23	12	20	24	22
Male	17	5	16	7	17	8	13	12	23	30
Non-Disadvantaged	45	26	49	26	31	29	23	29	46	48
Disadvantaged	3	5	3	7	5	2	2	3	1	4
Non-LEP	47	30	51	30	35	31	25	32	47	51
LEP	1	1	1	3	1	0	0	0	0	1
Non-Disabled	47	31	52	33	33	30	25	31	47	52
Disabled	1	0	0	0	3	1	0	1	0	0
% Passing										
Female	97%	96%	97%	96%	95%	96%	100%	85%	83%	91%
Male	94%	80%	88%	100%	100%	88%	100%	92%	70%	90%
Non-Disadvantaged	98%	96%	94%	96%	100%	97%	100%	86%	76%	90%
Disadvantaged	*	80%	*	100%	80%	*	*	*	*	100%
Non-LEP	98%	93%	96%	97%	97%	94%	100%	88%	77%	90%
LEP	*	*	*	*	*	n/a	n/a	n/a	n/a	*
Non-Disabled	96%	94%	94%	97%	100%	93%	100%	87%	77%	90%
Disabled	*	n/a	n/a	n/a	*	*	n/a	*	n/a	n/a

*Results are not reported for groups fewere than 3 students

SAT and ACT Results

The SAT and ACT are designed to assess student readiness for college. Many colleges require these test results as part of a student's application; and the test is taken voluntarily by students across the nation. This report uses the 2011 summary of math results for the 2011 graduating class of seniors, for tests taken through June of their senior year

Table 33 and Figure 72 shows that APS's SAT participation rate of 73 percent is 2 percentage points higher than the Virginia participation rate for 2011 graduates. It is notable that participation by APS students has increased by 9 percent since 2007, which is similar to the increase in participation by white students. During the same period of time, participation by APS seniors has increased by 26 percent for Hispanic students, 32 percent for Asian students, and 42 percent for black students.

Table 33. SAT Participation and Average Math Scores for Seniors, 2007- 2011.

YEAR	ARLINGTON			VIRGINIA*			NATION*		
	Number Tested	% of Graduates	Math	Number Tested	% of Graduates	Math	Number Tested	% of Graduates	Math
2011	962	73	551	61,398	71	509	1,647,123	na	514
2010	821	69	564	59,031	67	512	1,547,990	47	516
2009	812	68	548	59,612	68	512	1,530,128	46	515
2008	835	77	547	59,573	68	512	1,518,859	45	515
2007	886	79	548	58,921	73	511	1,494,531	48	515

Sources: College Board's *2011 College-Bound Seniors, Total Group Profile Report, State Profile Report,* and division-level data file.

Notes: This year's *College Bound Seniors 2011* includes students who tested through June of their senior year. Previous classes include students who took the SAT through March of their senior year.
For students who took the test more than once, the most recent score is used.
*State and national scores are from all test-takers, including both public and non-public schools; na=not available.

Figure 72. SAT Participation by Race or Hispanic Origin, 2007-2011

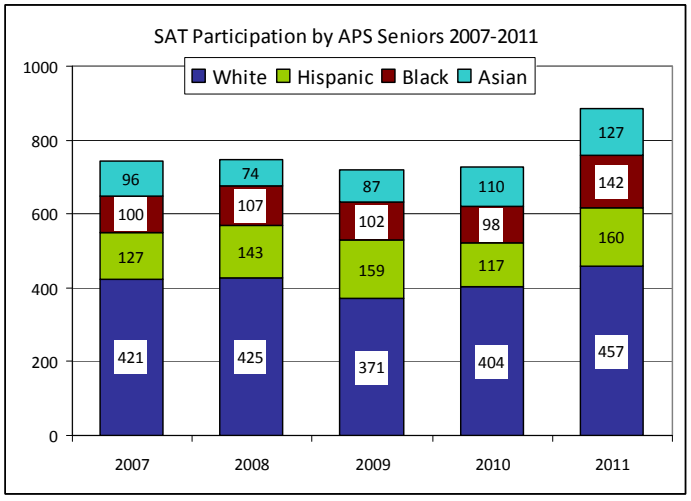


Figure 72 shows SAT scores that range from 200 to 800. For all three groups, the 2011 scores for mathematics decreased when compared to the scores in 2010. For 2011 results are equal to the average score for the group during the previous four years.

Figure 73 to Figure 76 show SAT results for Arlington, Virginia, and across the United States by race or Hispanic origin, as reported by seniors taking the SAT during the past five years.

Arlington's 2011 seniors who identified themselves as Asian on the SAT had the following results:

- Represented 13 percent of the seniors taking the SAT, which is slightly higher than their proportion in the APS general population.
- Had increased participation of 32 percent from 2007–11 to 127 students.
- Had an average SAT score of 570, exceeding the APS average score of 551.

- Had the most significant change among the four groups on the average SAT score,with a 48 point increase, which is more notable with concurrent increase in participation.
- Had average scores that fell slightly below the average score for Asian students across Virginia (581) and across the United States (595).

Arlington's 2011 seniors who identified themselves as black on the SAT had the following results:

- Represented 15 percent of the seniors taking the SAT, which is similar to their proportion of the total APS population.
- Had an increased participation of 42 percent from 2007–11 to 142 students.
- Had an average SAT score of 467, which was 84 points below the APS average of 551.
- Had an increase of 31 points on an SAT score during the five year period, which is notable with concurrent increase in participation.
- Had average scores that were higher than the scores for black students in Virginia and across the United States.

Figure 73. SAT Average Math Scores for Asian Seniors, 2007- 2011

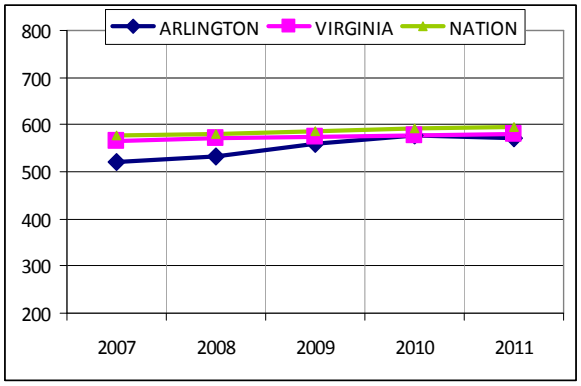
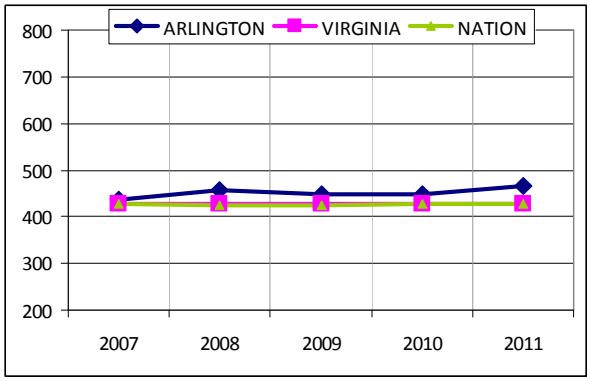


Figure 74. SAT Average Math Scores for Black Seniors, 2007- 2011



Arlington's 2011 seniors who identified themselves as Hispanic on the SAT had the following results:

- Represented 17 percent of the seniors taking the SAT, which is about 9 percentage points lower than their proportion of the total APS population.
- Had increased participation of 26 percent from 2007–11 to 160 students.
- Had an average SAT score of 490, which was 61 points below the APS average of 551.
- Had a relatively flat SAT score, which slightly decreased (2 points) during the last 5 years, which is notable with concurrent increase in participation.
- Had average SAT scores that were consistent with the average scores for Hispanic seniors across Virginia.

- Had average SAT scores that were slightly higher than the average scores for Hispanic seniors across the United States.

Arlington's 2011 seniors who identified themselves as white on the SAT had the following results:

- Represented 48 percent of the seniors taking the SAT, which is equal to their proportion of the total APS population.
- Had an increased participation of 9 percent from 2007–11 to 457 students.
- Had an average SAT score of 598, which was higher than the APS average of 551.
- Had an average SAT score that increased 1 point from 2007.
- The average SAT score decreased from a high of 612 in 2010, but within the five-year period, the increasing passing rate for white students coincided with a decrease in the number of students taking the SAT.
- Average SAT scores were similarly consistently higher than the average scores for seniors across Virginia and the United States.

Figure 75. SAT Average Math Scores for Hispanic Seniors, 2007- 2011

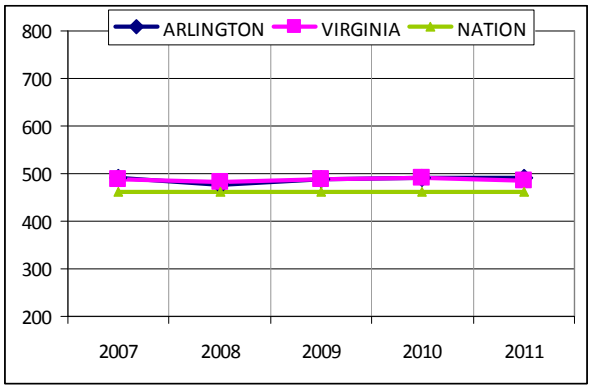
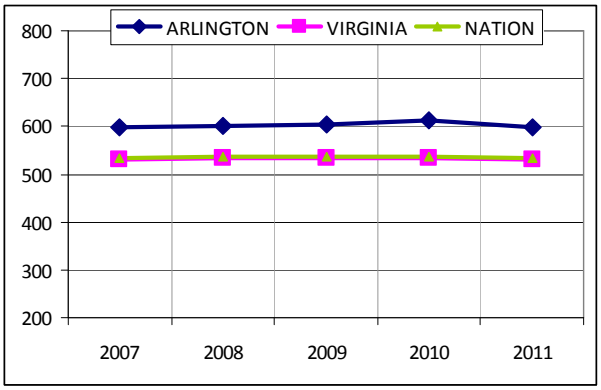


Figure 76. SAT Average Math Scores for White Seniors, 2007- 2011



The number of APS seniors taking the ACT was smaller than the number of students taking the SAT. Some students took both tests, but for this evaluation, we did not examine records to identify the overlap in students taking both tests. Instead, we included the math results from the ACT as another measure of students' preparedness for college-level mathematics.

During the past five years, the number of APS students taking the ACT has more than doubled to 328 students.

Scores for the mathematics portion of the ACT test range from 1 to 36. During this same time period, the average score for APS seniors has remained constant to around 23 points. Arlington's average ACT score is about 1 point higher than the average score for Virginia

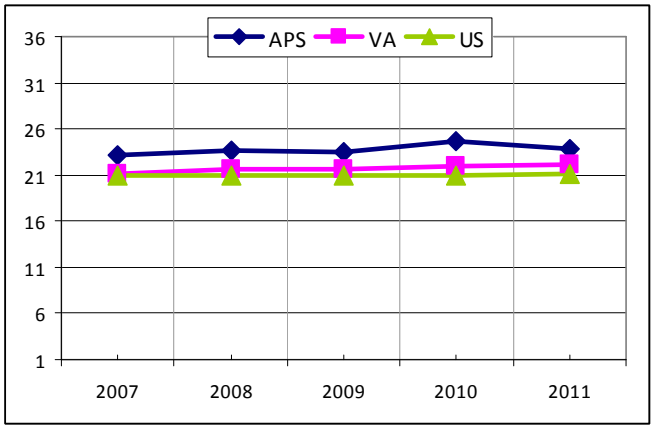
seniors and 2 points higher than seniors across the United States. ACT results have not been analyzed by race or Hispanic origin.

Table 34. ACT Participation and Average ACT Scores for Seniors from APS, VA (Public Schools) and the U.S., 2007-2011

Graduation Year	Students Tested	Mathematics		
		APS	VA	US
2011	328	23.8	22.1	21.1
2010	260	24.7	22	21
2009	285	23.5	21.7	21
2008	215	23.6	21.7	21
2007	152	23.2	21.1	21

Source: ACT College Readiness Letter for Arlington Public Schools, July 18, 2011

Figure 77. Average Act Scores for Seniors from APS, VA (Public Schools) and the U.S., 2007-2011.



Longitudinal Study of Enrollment

Earlier, this evaluation included results of a longitudinal study (Appendix G) of student data conducted by the HRC. In addition to looking at enrollment patterns, the study also looked at student performance in math. This analysis uses the same cohort of 819 students who were enrolled continuously in APS beginning in Grade 3 in 2003–04 and who completed Grade 9 in 2009–10.

Hanover's longitudinal study identified the following in its longitudinal analysis of student performance and the relationship between achievement and enrollment.

Cohort Achievement Trends

Looking at the students cohort over time,

- The highest average score on the third-grade math SOL test (average score 520.7) and the lowest score in the sixth-grade math SOL test (average score 403.4).
- The reason for the low average score on the sixth-grade SOL test was due to the fact that (a) well-performing sixth graders had enrolled in accelerated courses, and (b) these students' test scores were factored into the seventh- or eighth-grade SOL test scores.
- Stanford test-takers in the sixth grade performed better than fourth-grade test-takers (68.6 average compared to 61.5 average).

There are differences in SOL scores by race, LEP status, SPED status, economically disadvantaged status, and, to a lesser extent, gender. Hanover arrived at this outcome by *analyzing each group independent of the other*. Students in the cohort who are

- White, male, Asian, and/or have above-average attendance tend to score higher than other students on the SOL test. This result contrasts with the annual performance of students on the SOL tests over time.
- Female, Hispanic, black, and/or have LEP, SPED, and economically disadvantaged designations performed below average on the SOL test. Those students with below-average attendance also did poorly on the SOL test.
- Group trends on the Stanford 10 test were similar to the group trends on the SOL test.
- In regard to SOL scores, there was a general downward trajectory for every student group from the third grade to the sixth grade. From the sixth grade onwards, there was a general upward movement in SOL scaled scores.
- In general, there appeared to be a convergence between students SOL test scores as students approached the ninth grade. In essence, the difference in test scores between groups became smaller after the sixth grade.

When Hanover reviewed the cohort factors holistically using regression analysis, it found that two groups had no influence over SOL test scores: gender and economically disadvantaged status.

Figure 78 shows that male students and female students have similar SOL scores across time. Male students scored slightly higher than female students in aggregate (493 compared to 484), but the difference was not large enough to register in the regression analysis.

In Figure 78 it appears that economically disadvantaged students were the second lowest performing group on the SOL tests. However, the regression analysis found that economically disadvantaged status did not matter in predicting SOL test scores. It appears that there are the following two reasons:

- Hanover used a conservative statistical approach to come to its conclusion. The analysis applies a p-value of 0.01, indicating 99 percent certainty that the findings are statistically robust.
- The conclusion at the 95 percent confidence level (p-value of 0.05) would have resulted in a different conclusion, suggesting that economically disadvantaged status *does* matter in predicting the SOL test score, although gender remains insignificant. Hanover's analysis found that economically disadvantaged status was negatively correlated with being white and positively correlated with LEP status and being Hispanic (see the correlation table that follows). This moderately high correlation with several variables "weakened" the variable's power in predicting SOL test scores.

Figure 78. Longitudinal Cohort - Average SOL Score by Student Type over Time.

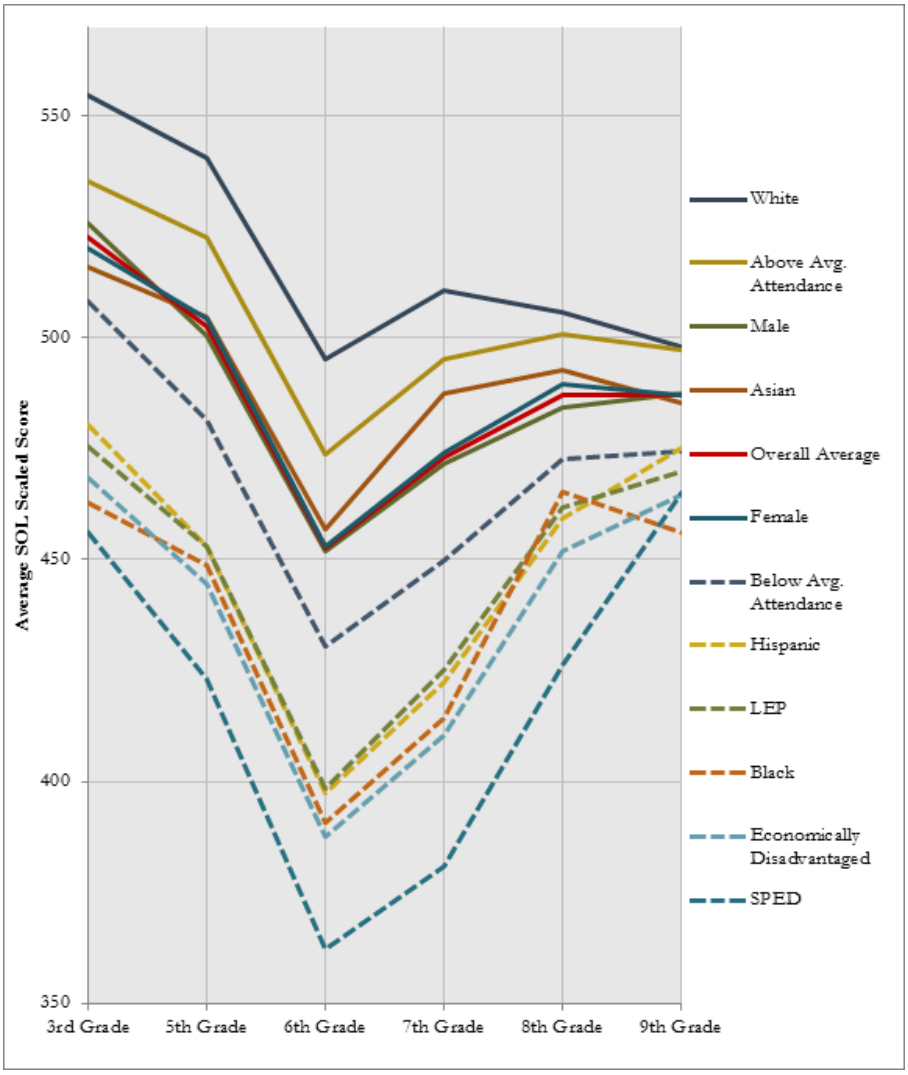


Table 35. Longitudinal Cohort - Correlation between various predictor variables

	Asian	Black	Hispanic	White	LEP 2006	SPED 2006	Disadvantaged 2006	Days Present 2006	Summer Course	Course Category 2006
Asian	1.00									
Black	-0.13	1.00								
Hispanic	-0.19	-0.23	1.00							
White	-0.33	-0.40	-0.61	1.00						
LEP 2006	0.25	-0.13	0.66	-0.64	1.00					
SPED 2006	-0.07	0.13	0.18	-0.20	0.14	1.00				
Disadvantaged 2006	0.11	0.13	0.53	-0.62	0.63	0.24	1.00			
Days Present 2006	0.06	0.01	-0.12	0.06	-0.07	-0.11	-0.05	1.00		
Summer Course	-0.04	0.18	0.27	-0.34	0.33	0.09	0.32	-0.03	1.00	
Course Category 2006	0.02	-0.16	-0.31	0.37	-0.32	-0.66	-0.40	0.25	-0.17	1.00

1. Correlation Note: Correlation values range from 1 to -1. 0 = No correlation. Positive Values = positive relationship between two variables (e.g, disadvantaged status and Hispanics). Negative values = negative relationship between two variables (e.g., disadvantaged status and white).

Overall, Hanover suggests that economically disadvantaged status is on the borderline of being a significant predictor, but it was not identified as a predictor because its relationship with other variables that are stronger predictors of SOL test scores (white, Hispanic, and LEP status) limits the variable's power to predict SOL scores.

Relationship Between Enrollment and Achievement for Cohort

- There is a moderate and positive correlation between test scores and math course level.
- Although HRC was unable to find a strong relationship between attendance and test scores, they were able to determine that those who had above-average attendance tended to perform better than those who had below-average attendance.
- There is hardly any association between days of attendance in one school year and the corresponding course enrollment level in the following school year.
- From a regression analysis, HRC determined that all but two indicators included in the model influence a student's SOL test score. The two indicators that were not found to be statistically significant, when controlling for other factors, were gender and economically disadvantaged status. By contrast, factors such as race, LEP and SPED status, attendance, summer course enrollment, and level of course taken influence a student's SOL test score in a statistically significant way.

Summary of Outcome Results

To what degree do all APS students and all student groups demonstrate rising achievement in mathematics? How accurate are local assessments at predicting student performance on standardized tests and/or early placement in higher level mathematics courses? How does the

performance of Arlington students compare with state and national results? The results presented in this evaluation suggested some strength and some areas that require adjustments.

- The process for administering and monitoring the results of quarterly mathematics assessments needs an overhaul to make the results useful for teachers to direct instruction, for math coaches and central office administrators to provide the appropriate support, and for monitoring by administrators with the schools and in the central offices.
- The gaps among student groups increase as students move from elementary to middle school
- The gaps in students successfully completing Algebra I by the end of Grade 8 have decreased, but they have not been eliminated. This goal will continue to be a priority for the program, particularly with the adoption of the Virginia standards to have all students complete Algebra I by the end of Grade 8.
- APS lags behind Virginia on a number of SOL-related measures. Although this situation is a concern, APS also needs to provide a more accurate report on the experience of APS students. We need to continue monitoring middle school instruction to ensure that students have the tools and the knowledge to succeed in mathematics. At the same time, reporting should be adjusted to clearly communicate that accelerating students is a positive experience.
- Scores on the mathematics portion of the Stanford 10 indicate that the program has made solid gains across most groups, when comparing APS and national percentile scores.
- Students with disabilities were the only group that did have a notable increase in the average percentile scores on the Stanford 10. This result reinforces the trends that are noted for the same group on the SOL assessments. Work is needed to ensure that students with disabilities are participating in mathematics instruction that prepares them for success.
- There are gaps in participation in the AP and IB programs. As more students take the AP courses, the passing rate continues to increase on many tests, but these increases are not consistent among all groups and in many cases are too small to report.

How Satisfied Were Users of the Mathematics Program?

This evaluation initially planned to survey samples of students and parents to gather feedback on their experiences and impressions of APS mathematics instruction. Because the state standards for math were being revised, the mathematics program staff shifted their focus to preparing APS for the changes. Part of this effort included the planning and facilitation of a year-long series of principal retreats.

The retreats were intended to help elementary principals understand the following:

- Revisions to the state standards and the expectation for all students to complete Algebra I by grade 8
- What these changes meant for instruction in earlier grades
- How elementary mathematics results are used by middle schools to place students in the appropriate mathematics courses
- Variations in performance by student groups

- The importance of student discourse and questioning to understand mathematics concepts
- The importance of purposeful planning

In September and October of 2011, HRC administered a survey to elementary and middle school principals who had attended the retreats. The goal of the survey was to assess the impact and value of the principals' retreats, and the questionnaire asked principals to rate how strongly they agreed that the retreat had improved their understanding in various areas, was effective in promoting broader communication, and was effective in addressing certain issues. Further, the survey instrument provided space for respondents to explain what they believed were the most helpful and least helpful components of the retreat, as well as offer any additional feedback they thought would be useful.

In the sections that follow, a summary analysis of the survey results shows responses separately for elementary and middle school principals. The full report by Hanover can be found in Appendix G.

Hanover's analysis indicates the following:

- More than half of the elementary principal respondents strongly agreed that the retreats improved their understanding of 'the importance of student discourse and questioning to the development of student understanding of mathematical concepts' (53 percent).
- Eighty-eight percent either agreed or strongly agreed that retreats improved their understanding of 'how the changes in Virginia and APS expectations will affect instruction in earlier grades.'
- Multiple respondents disagreed that the principals' retreat improved their understanding of:
  - *Specific needs of ELL students with regard to language support in mathematics*
  - *How to understand and use testing data to better meet the needs of special student populations*
  - *Specific needs of special needs students with regard to support in mathematics instruction and ways to address their instructional needs*
  - *The alignment between special education services and mathematics instruction*

  Notably, all of these areas relate directly to students with specific needs.
- Some principals also specifically mentioned special needs education-related concerns when asked to describe the component of the retreat that they found least helpful.
- The perceived lack of special/specific needs information at the retreat may indicate that special/specific needs instruction is an area that deserves more attention in the future.

Summary of Satisfaction Results

To what degree do principals believe that they understand the new standards and can ensure that all students leave all elementary schools ready to complete Algebra I successfully in Grade 8?

Principal feedback suggest a need for more purposeful collaboration between SPED and mathematics, as well as ESOL/HILT and mathematics. This result underscores the results identified in other parts of this evaluation.

Related Findings That Were not the Primary Focus of the Evaluation

APS lacks access to student data in mathematics that would allow for timely monitoring and intervention. This evaluation highlighted this concern in a number of areas including the following:

- The process for quarterly assessments.
- Standard reports to monitor enrollment in various courses do not exist. Data produced by Planning and Evaluation meets the need of the evaluation, but it does not provide the tools that teachers and administrators need to support student learning in mathematics.
- The profile of a student's mathematics assessments is not complete in the student information system. Data exists in multiple places, making it difficult for most staff to get a full picture of the experience and outcomes.

Outcome Variation by Mathematics Programs

The variation in the observation results by school level reflects the focus of mathematics since the last evaluation. The program has put time, effort, and resources into preparing teachers to support all students on a more accelerated path in mathematics. Those efforts play out in the improvements seen across elementary observations. At the same time, some practices observed in the high school suggest the need for more consistent support across all grade levels.

Unexpected Findings

Principal feedback suggests that there was value in offering a series of mathematics retreats. Instruction is using the model to approach a similar process for English language arts during the 2011–12 school year.

Use of Resources

This evaluation did not directly address the use of resources. Evaluation staff is working with the Budget Advisory Committee to address this question in the upcoming evaluation of world languages.

Section III: Recommendations

This report reviews the evaluation of the APS mathematics program. This evaluation is the second one undertaken for the mathematics program and answers questions about program implementation, program outcomes, and stakeholder satisfaction.

Strengths

- The quality of math instruction in APS has improved across elementary schools as evident in observations, high passing rates on state assessments, and increased scores on national assessments. Improvements may be the result of
    - The addition of math coaches at all the elementary schools which has enabled the math office to use a "train the trainer" model to effectively implement math professional development across the district.
    - Systemic efforts to develop teacher understanding and use of concept building and higher levels of cognitive demands in mathematics instruction.
    - The focus on providing a minimum of 60 minutes of mathematics instruction daily. The disruptions identified in 2005 were not an issue in this evaluation.
- APS mathematics instruction provides students across all grade levels with a strong foundation of emotional and organizational support that is critical to learning and academic success.
- As more students take AP mathematics courses, the passing rate continues to increase on many tests.
- Scores for mathematics on the Stanford 10 show solid gains for most groups when comparing APS and national percentile scores. The increases were notable for Black, Hispanic and Asian students, students identified as limited English proficient and economically disadvantaged students. Students identified with a disability were the only APS group that did not show progress.

Areas That Need Improvement

- Among all students, white students are more likely than others to enroll in accelerated mathematics course.
- Gaps in achievement remain, but for most groups the gaps have narrowed mathematics SOL assessments.
- More work needs to be done to ensure that students with disabilities are participating in math instruction that prepares them for success.

- There are gaps in enrollment in Advanced Placement and International Baccalaureate programs. Increases are not consistent among all groups, and, in many cases, the increases are too small to report.
- The process for administering and monitoring the results of quarterly math assessments needs to be more useful for teachers, math coaches, and central office administrators. There needs to be more support for direct instruction and for monitoring by administrators.
- APS needs to provide a more accurate report on the math experiences of APS students so that accurate conclusions can be drawn. Reporting should be adjusted to clearly communicate that acceleration is a positive experience.
- Given the results from the current study, APS lags behind Virginia on a number of Standards of Learning (SOL)-related measures. APS needs to continue monitoring middle school instruction to ensure that students have the necessary tools and knowledge for success.

Recommendations

The following recommendations are provided.

1. Use the results of mathematics assessments to monitor students' progress and to inform instruction that ensures student achievement.
    - Use results collected through the formative assessment benchmark system to inform mathematics instruction.
    - Design and implement valid and reliable mathematics assessments, administered through the formative assessment benchmark system, that gauge students' skills and abilities. These results will inform APS about student achievement at key points in time.
2. Curriculum revisions and ongoing professional development need to focus on effectively implementing culturally responsive teaching strategies into mathematics instruction.
3. Once instructional staff has access to standardized reports currently being tested by Enterprise Solutions mathematics needs to implement processes to help teachers and administrators access the enrollment data and to provide targeted intervention and curricular support to identified subgroups who are underrepresented in accelerated math courses.
4. More coordinated efforts will be undertaken with the staff that provides instruction to identified groups of students who are not making expected progress in mathematics. The math office needs to collaborate with
    - the ESOL-HILT office to address specific needs of LEP students, the minority achievement office to
    - the Minority Achievement office to address discourse in mathematics as a way to improve culturally responsive teaching practices.

- the special education to develop an action plan for 2012–13 and beyond to provide students with disabilities with targeted math intervention and support.

Appendix A: List of Tables and Figures

Arlington Public Schools
1426 North Quincy Street
Arlington, VA 22207
Full report with appendices available on www.apsva.us/evaluationreports

Classroom Assessment Scoring System (CLASS)

What is CLASS?

The Classroom Assessment Scoring System (CLASS) is a classroom observation tool developed at the University of Virginia's Curry School of Education. It aims to provide a common lens and language focused on classroom interactions that encourage student learning.

CLASS observations break down the complex classroom environment to help educators focus on boosting the effectiveness of their interactions with learners of all ages. Observations rely on categorizing interactions within the CLASS framework.

The CLASS tool organizes teacher-student interactions into three broad domains: Emotional Support, Classroom Organization, and Instructional Support. The upper elementary and secondary tools include an additional domain, Student Engagement. Within all domains except Student Engagement, interactions are further organized into multiple dimensions. Table 1 lists the domains and dimensions for each level.

Emotional Support: Students' social and emotional functioning in the classroom is increasingly recognized as an indicator of school readiness, a potential target for intervention, and even as a student outcome that might be governed by a set of standards similar to those for academic achievement. Students who are more motivated and connected to others are much more likely to establish positive trajectories of development in both social and academic domains. Teachers' abilities to support social and emotional functioning in the classroom are therefore central to ratings of effective classroom practices.

Classroom Organization: The classroom organization domain assesses a broad array of classroom processes related to the organization and management of students' behavior, time, and attention in the classroom. Classrooms function best and provide the most opportunities for learning when students are well-behaved, consistently have something to do, and are interested and engaged in learning tasks.

Instructional Support: The theoretical foundation for the instructional support domain is based on research on children's cognitive and language development. Thus the emphasis is on students' construction of usable knowledge, rather than rote memorization, and metacognition—or the awareness and understanding of one's thinking process. As a result, the instructional support domain does not make judgments about curriculum content; rather, it assesses the effectiveness of teachers' interactions with students that support cognitive and language development.

Student Engagement: Unlike other domains, student engagement focuses strictly on student functioning, and measures the overall engagement level of students in the classroom.

Table 1. CLASS Domains and Dimensions.

Domain	Dimensions			
	Pre-K	**Lower Elementary**	**Upper Elementary**	**Secondary**
Emotional Support	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Positive Climate Negative Climate Teacher Sensitivity Regard for Adolescent Perspectives
Classroom Organization	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats	Behavior Management Productivity Instructional Learning Formats
Instructional Support	Concept Development Quality of Feedback Language Modeling	Concept Development Quality of Feedback Language Modeling	Content Understanding Analysis and Problem Solving Quality of Feedback Instructional Dialogue	Content Understanding Analysis and Problem Solving Quality of Feedback
Student Engagement	n/a	n/a	Student Engagement	Student Engagement

Based on research from the University of Virginia's Curry School of Education and studied in thousands of classrooms nationwide, the CLASS

- focuses on effective teaching
- helps teachers recognize and understand the power of their interactions with students
- aligns with professional development tools
- works across age levels and subjects

CLASS-based professional development tools increase teacher effectiveness, and students in classrooms where teachers are observed to demonstrate and earn higher CLASS scores achieve at higher levels than their peers in classrooms with lower CLASS scores.[1]

Adoption of CLASS by APS

The 2005-11 strategic plan includes an indicator that targets an increasing percentage of teachers displaying effective, differentiated instruction during annual observations. This indicator was new. However, while differentiation was occurring, no valid or efficient measurement system was in place to capture this information. Therefore, APS targeted development of such a measure.

Table 2. 2005-11 Strategic Plan Indicator on Annual Observations of Differentiated Instruction.

	Baseline ('99-05 Strategic Plan)		**2005 to 2011 Strategic Plan**					
			Results				*Targets*	
	2003-04	2004-05	2005-06	2006-07	2007-08	***2008-09***	*2009-10*	*2010-11*
Indicator 57 – Percentage of teachers displaying effective, differentiated instruction during annual observations								
Target	n/a	n/a	Develop measure	Develop measure	Develop measure	***Baseline***		
Progress			Not developed	Not developed	Not developed	***Not developed***		

In 2009, staff began to look at the annual observation processes. Two system-wide processes were identified for initial investigation:

- Teacher evaluation observations
- Observations conducted for program evaluation.

Staff next examined whether there were measures within the above processes to provide consistent and reliable data across the evaluations. This criterion eliminated the teacher evaluation system since there is currently no means by which to extract and quantify data from observations. Also, there is variability in use of observations as described in the teacher evaluation system ranging from evaluation of probationary teachers that is exclusively an observation-based system to periodic observations of continuing contract teachers.

However, the observations conducted for program evaluation had the potential to meet our requirements if APS could identify a single observation tool that would be used by all programs, and if we could ensure the validity and reliability of the observation tool.

[1] Teachstone Inc. http://www.teachstone.org/about-the-class/

A Proposed Measure

Department of Instruction staff, joined by representatives from Student Services and Information Services, entered a lengthy process: to review observation tools used in past evaluations and other initiatives and to identify a tool or create a tool that met our requirements for validity and consistency. This endeavor also provided additional opportunity to consider whether such tools might also yield information on the efficacy of teachers' use of culturally competent teaching behaviors, a goal of the Division's cultural competence initiative. This work brought us to the CLASS tool.

APS had experience using CLASS in 2009 as part of the evaluation of APS pre-K programs. To ensure that this selection was appropriate to collect data related to differentiation, in April 2010, a group of APS staff participated in CLASS training for secondary instruction. Once the training was complete, a pilot study was conducted.

APS CLASS Pilot

Pilot Observations

- Since CLASS was used in the 2009 evaluation of Pre-K programs, the pilot focused on secondary classrooms.
- Multiple observations were conducted at seven of nine secondary schools during late May and early June 2010 by certified raters. Observations included a mix of core and elective classrooms and self-contained Special Education and ESOL/HILT classrooms.
- Observations were conducted in 20 minute intervals as recommended by CLASS protocols.

Observers

- Completed a two-day training session and became certified through the UVA-proctored assessment.
- Did not observe teachers whom they currently evaluate, and agreed to maintain teacher and school anonymity.
- Were paired with a co-observer during each observation to determine if coding was consistent across individuals.

Differentiation

The Gifted Services (GS) Supervisor reviewed the tool and participated in the pilot. She noted that the four domains measured by the secondary CLASS tool are essential in effectively differentiated classrooms: emotional support of the learner; classroom organization to facilitate all students' learning; instructional support that strengthens student understanding; and student engagement. The tool not only itemizes the behaviors of the student and teacher in an effectively differentiated classroom but it also expects a level of student and teacher behavior that is effective for the instruction of gifted learners. The specific indicator measured by CLASS that is essential for gifted learners is Analysis & Problem Solving.

In this limited sample of observations using the secondary CLASS, the decreased scores found in the area of Analysis & Problem Solving parallel what was seen in the GS Program Evaluation. In review of the data collected using the Classroom Observation Scale – Revised (COS-R) observation tool used in grade 3-5 classrooms during the GS Program Evaluation, it had been noted that although there was a moderate adherence to the basic principles of differentiated instruction, differentiation specifically for gifted students in the categories of problem-solving and research were too small to calculate categorical means.[2]

While all domains address differentiation, four dimensions within those domains were determined to be the most essential for effectively differentiated classrooms:

1. Teacher Sensitivity (pre-k through secondary)
2. Regard for Student Perspectives (pre-K & elementary); Regard for Adolescent Perspectives (secondary)
3. Instructional Learning Formats (pre-k through secondary)
4. Concept Development (pre-K & lower elementary); Analysis and Problem Solving (upper elementary and secondary)

Composites of these indicators from the CLASS will be used by APS as a measure of differentiation for all learners.

CLASS and Program Evaluation

APS plans to conduct CLASS observations for all program evaluation reports, starting in the 2010-11 school year. In the fall of 2010, the Office of Planning and Evaluation recruited retired teachers and administrators to become certified CLASS observers. Certification is managed by the University of Virginia. Trainees undergo in-depth training to help them use the tool effectively in the field. An assessment is used to ensure that the observers have demonstrated reliability with the CLASS tool.

Two series of CLASS observations were conducted in the 2010-11 school year, one in the fall and one in the spring. A total of 555 observations of mathematics, English language arts, and world languages instruction were completed. Based on recommendations from the University of Virginia, each observation lasted approximately 30 minutes and observers were instructed to view either the beginning or end of a class. Ten additional minutes were provided for coding of the observation. The sample of classrooms observed included all APS schools and programs. Self-contained classrooms that serve ESOL/HILT or students identified with a disability, as well as mainstream classrooms where ESOL/HILT and students identified with a disability were also included.

[2] Gifted Services Evaluation Report, November 2008

Research Foundations of CLASS

The CLASS framework is derived from developmental theory and research suggesting that interactions between students and adults are the primary mechanism of child development and learning.

Elementary CLASS

Research provides evidence about the types of teacher-student interactions that promote positive social and academic development. The Classroom Assessment Scoring System™ (CLASS) provides a reliable, valid assessment of these interactions[3]

Selected studies demonstrate:

• Higher levels of instructional support are related to preschoolers' gains in pre-reading and math skills.[4]

• High levels of emotional support contribute to preschoolers' social competence in the kindergarten year.[5]

• High levels of emotional support are associated with growth in reading and math achievement from kindergarten through fifth grade.[6]

• High levels of classroom organization are associated with gains in first graders' literacy.[7]

• Kindergarten children are more engaged and exhibit greater self-control in classrooms offering more effective teacher-child interactions.[8]

---

[3] Karen LaParo, Robert Pianta, and Meghan Stuhlman, "Classroom Assessment Scoring System (CLASS): Findings from the Pre-K Year," Elementary School Journal, 104:5, pages 409-426.

[4] Mashburn, Pianta, Hamre, Downer et al., Child Development,79, pages 732-749.

[5] Timothy Curby, Jennifer Locasale-Crouch, Timothy Konold, Robert Pianta, Carollee Howes, Margaret Burchinal et al., "The Relations of Observed Pre-K Classrooms Quality Profiles to Children's Academic Achievement and Social Competence," Early Education and Development, 19, pages 643-666.

[6] Robert Pianta, Jay Belsky, Nathan Vandergrift, Renee Houts, Fred Morrison, and NICHD-ECCRN, "Classroom Effects on Children's Achievement Trajectories in Elementary School," American Education Research Journal, 49, pages 365-397.

[7] Claire Cameron Ponitz, Sara Rimm-Kaufman, Laura Brock, and Lori Nathanson, "Contributions of gender, early school adjustment, and classroom organizational climate to first grade outcomes," Elementary School Journal, 110, 142-162.

[8] Sara Rimm-Kaufman, Timothy Curby, Kevin Grimm, Lori Nathanson and Laura Brock, "The Contribution of Children's Self-Regulation and Classroom Quality to Children's Adaptive Behavior in Kindergarten," Developmental Psychology, in-press. See also NICHD ECCRN, "A Day in Third Grade: A Large- Scale Study of Classroom Quality and Teacher and Student Behavior," Elementary School Journal, 105, pages 305-323.

• First-grade children at risk for school failure perform on par with peers, both socially and academically, when exposed to classrooms with effective teacher-student interactions.[9]

Moreover, studies conducted in over 6,000 classrooms provide evidence that students in PK-5 classrooms with higher CLASS ratings realize greater gains in achievement and social skill development.[10]

Secondary CLASS

Research using the more recently developed secondary CLASS tool has shown that teachers' skills in establishing a positive emotional climate, their sensitivity to student needs, and their structuring of their classroom and lessons in ways that recognize adolescents' needs for a sense of autonomy and control, for an active role in their learning, and for opportunities for peer interaction were all associated with higher relative student gains in achievement.[11]

Alignment with APS Initiatives

Differentiation

The CLASS tool was adopted by APS to address the need for a valid and efficient measurement system that would allow the school system to capture information for the strategic plan on the percentage of teachers displaying effective, differentiated instruction during annual observations.

Teacher Evaluation (Danielson)

The CLASS tool is heavily aligned with Charlotte Danielson's Framework for Teaching[12], which sets forth standards for teaching behaviors in the areas of planning, instruction, classroom environment, and professional responsibility. Danielson's Levels of Performance rubrics are the foundation for all T-Scale staff evaluation in APS.

---

[9] Bridget Hamre and Robert Pianta, "Can Instructional and Emotional Support in First Grade Classrooms Make a Difference for Children At Risk of School Failure?" Child Development, 76, pages 949-967.

[10] Website http://curry.virginia.edu/uploads/resourceLibrary/CLASS-MTP_PK-12_brief.pdf Center for Advanced Study of Teaching and Learning Charlottesville, Virginia, **Measuring and Improving Teacher-Student Interactions in PK-12 Settings to Enhance Students' Learning**

[11] Joseph P. Allen, Anne Gregory, Amori Mikami, Janetta Lun, Bridget Hamre, and Robert C. Pianta, "Observations of Effective Teaching in Secondary School Classrooms: Predicting Student Achievement with the CLASS-S." Submitted.

[12] Charlotte Danielson (2007), *Enhancing Professional Practice: A Framework for Teaching*, Alexandria, VA: ASCD.

Cultural Competence

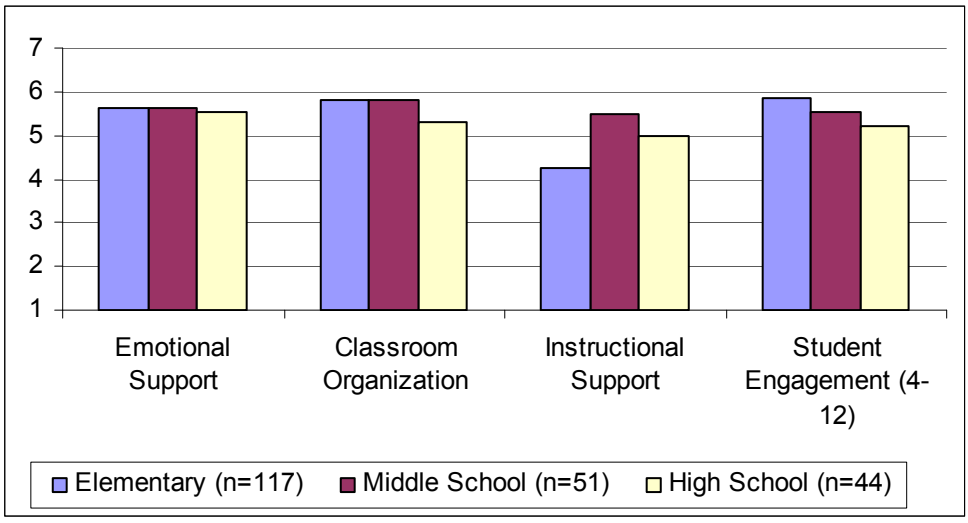
There is strong alignment between Gay's Exemplars of Culturally Responsive Behaviors[13] and classroom behaviors identified in the CLASS tool. The APS Council for Cultural Competence was established in 2003 to develop the framework for permanent, systemwide cultural competence activities including ongoing cultural competence training for all staff. Cultural competence is a set of attitudes, skills, behaviors, and policies that enable organizations and staff to work effectively in cross-cultural situations.

[13] Geneva Gay (2000). *Culturally Responsive Teaching: Theory, Research, & Practice.* New York: Teachers College Press.

CLASS Results for Mathematics Instruction, 2010-11

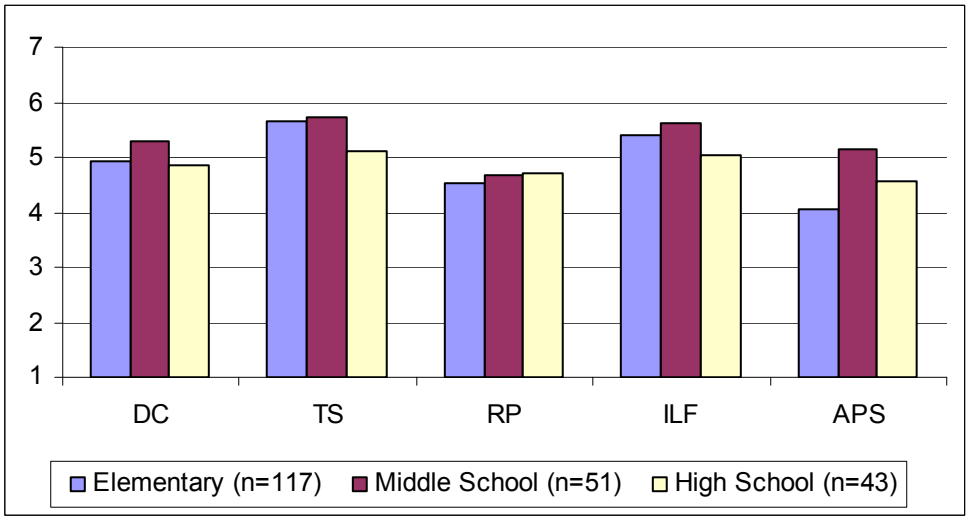
Level	Dimension/Domain	N	Minimum	Maximum	Mean	Std. Deviation
Elementary	Emotional Support	117	3.00	7.00	5.61	0.87
	Positive Climate	117	3	7	5.54	1.22
	Negative Climate	117	1	7	1.27	0.76
	Teacher Sensitivity	117	3	7	5.64	1.13
	Regard for Student Perspectives (K-5)	115	2	7	4.54	1.31
	Classroom Organization	117	2.67	7.00	5.83	0.93
	Behavior Management	117	3	7	6.11	1.11
	Productivity	117	2	7	5.97	1.11
	Instructional Learning Formats	114	2	7	5.39	1.09
	Instructional Support	116	1.67	7.00	4.25	1.19
	Content Understanding (4-12)	36	2	7	4.58	1.38
	Analysis and Problem Solving (4-12)	36	2	7	4.06	1.33
	Concept Development (K-3)	79	1	7	4.05	1.37
	Language Modeling (K-3)	79	1	7	4.06	1.44
	Instructional Dialogue (4-5)	25	2	6	4.00	1.26
	Quality of Feedback (all grades)	116	2	7	4.51	1.30
	Student Engagement (4-12)	37	3	7	5.84	0.93
Middle School	Emotional Support	51	3.75	6.75	5.61	0.81
	Positive Climate	51	3	7	5.57	0.98
	Negative Climate	51	1	4	1.51	0.81
	Teacher Sensitivity	51	3	7	5.73	1.10
	Regard for Adolescent Perspectives (6-12)	51	2	6	4.67	0.99
	Classroom Organization	51	3.00	7.00	5.80	0.99
	Behavior Management	51	3	7	5.84	1.19
	Productivity	51	3	7	5.92	1.06
	Instructional Learning Formats	51	3	7	5.63	1.02
	Instructional Support	51	3.33	7.00	5.47	1.03
	Content Understanding (4-12)	51	3	7	5.57	1.20
	Analysis and Problem Solving (4-12)	51	3	7	5.14	1.15
	Quality of Feedback (all grades)	51	3	7	5.71	1.12
	Student Engagement (4-12)	51	3	7	5.53	1.08
High School	Emotional Support	44	3.75	7.00	5.52	0.82
	Positive Climate	44	2	7	5.50	1.15
	Negative Climate	43	1	3	1.26	0.49
	Teacher Sensitivity	43	3	7	5.09	1.11
	Regard for Adolescent Perspectives (6-12)	44	2	7	4.70	1.25
	Classroom Organization	44	1.67	7.00	5.29	1.16
	Behavior Management	44	1	7	5.30	1.32
	Productivity	44	2	7	5.55	1.30
	Instructional Learning Formats	44	2	7	5.02	1.17
	Instructional Support	44	2.67	7.00	5.00	1.18
	Content Understanding (4-12)	44	2	7	5.27	1.23
	Analysis and Problem Solving (4-12)	43	2	7	4.56	1.50
	Quality of Feedback (all grades)	43	3	7	5.21	1.25
	Student Engagement (4-12)	45	2	7	5.21	1.34

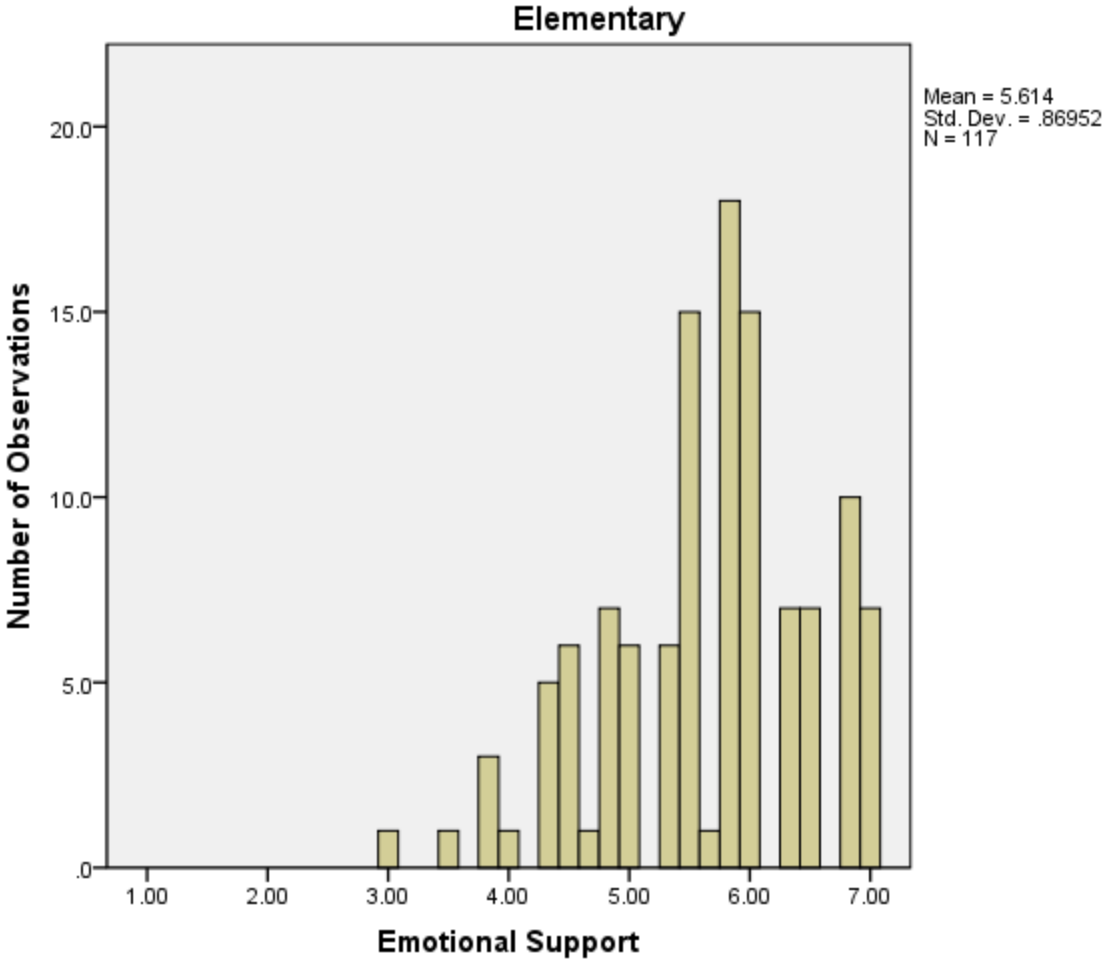
Level	Dimension/Domain	N	Minimum	Maximum	Mean	Std. Deviation
Total	Emotional Support	212	3.00	7.00	5.59	0.84
	Positive Climate	212	2	7	5.54	1.15
	Negative Climate	211	1	7	1.33	0.73
	Teacher Sensitivity	211	3	7	5.55	1.13
	Regard for Student Perspectives (K-5)	115	2	7	4.54	1.31
	Regard for Adolescent Perspectives (6-12)	95	2	7	4.68	1.11
	Classroom Organization	212	1.67	7.00	5.71	1.01
	Behavior Management	212	1	7	5.88	1.21
	Productivity	212	2	7	5.87	1.15
	Instructional Learning Formats	209	2	7	5.37	1.10
	Instructional Support	211	1.67	7.00	4.70	1.26
	Content Understanding (4-12)	131	2	7	5.20	1.32
	Analysis and Problem Solving (4-12)	130	2	7	4.65	1.39
	Concept Development (K-3)	79	1	7	4.05	1.37
	Language Modeling (K-3)	79	1	7	4.06	1.44
	Instructional Dialogue (4-5)	25	2	6	4.00	1.26
	Quality of Feedback (all grades)	210	2	7	4.94	1.34
	Student Engagement (4-12)	133	2	7	5.51	1.16

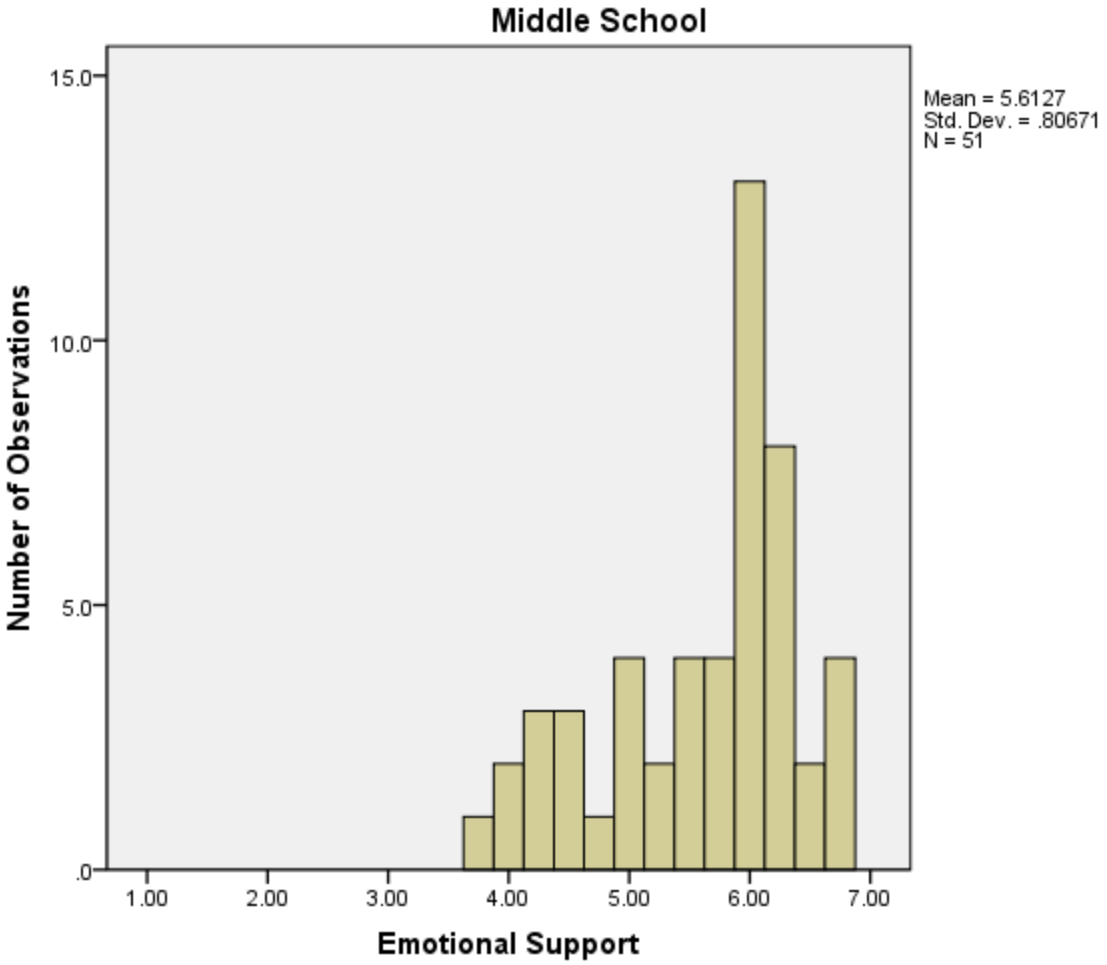


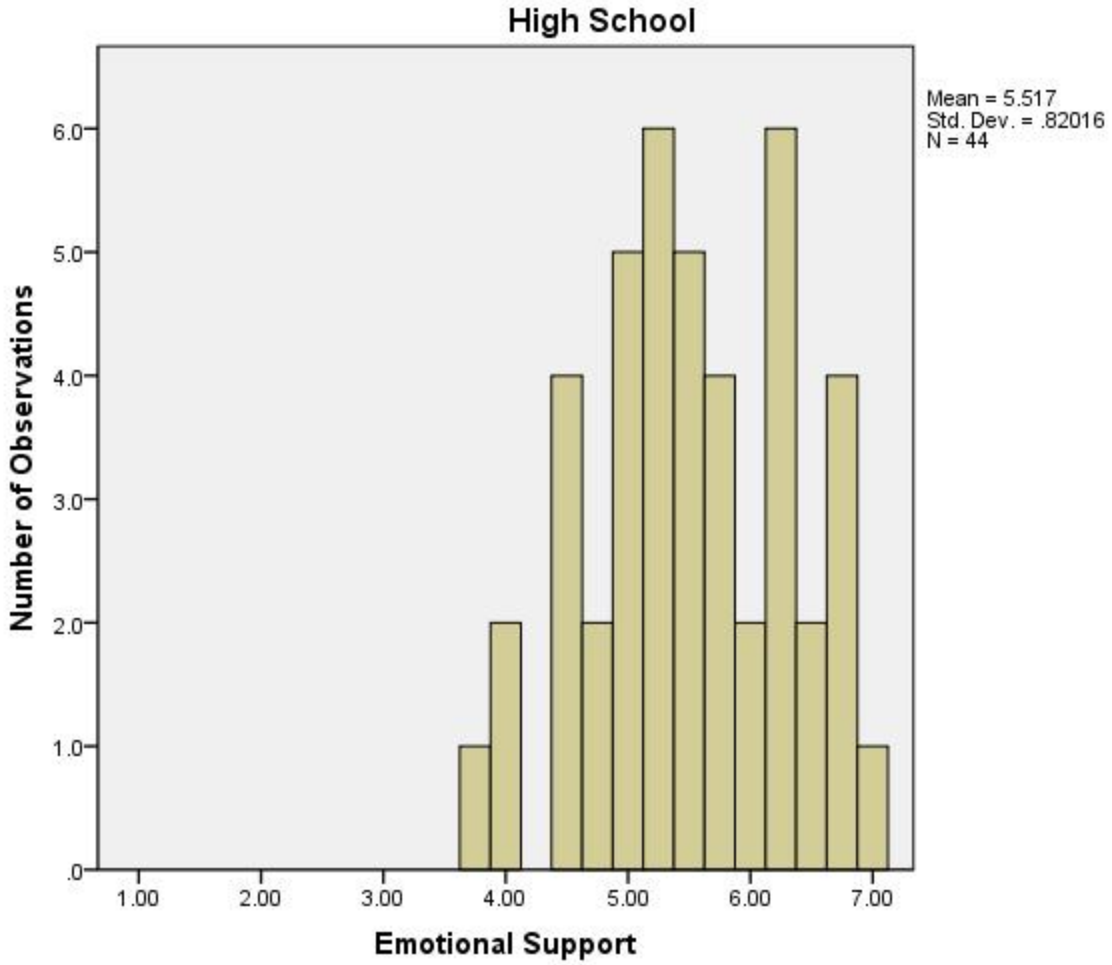
CLASS Differentiation Composite for Mathematics Instruction, 2010-11

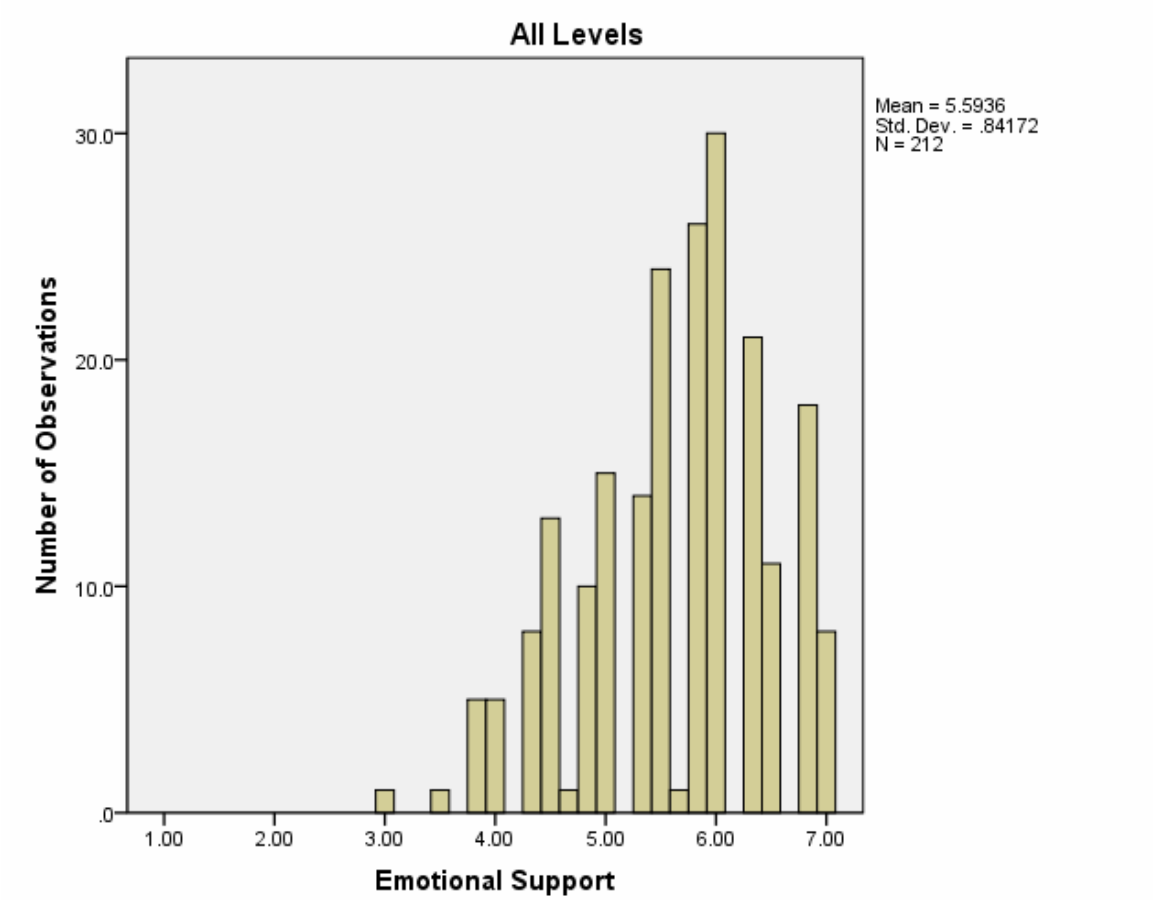
Level	Differentiation Composite	N	Minimum	Maximum	Mean	Std. Deviation
Elementary	Differentiation Composite	117	2.75	7.00	4.92	0.95
	Teacher Sensitivity	117	3	7	5.64	1.13
	Regard for Student Perspectives (K-5)	115	2	7	4.54	1.31
	Instructional Learning Formats	114	2	7	5.39	1.09
	Concept Development (K-3)	79	1	7	4.05	1.37
	Analysis and Problem Solving (4-12)	36	2	7	4.06	1.33
Middle School	Differentiation Composite	51	3.50	6.50	5.29	0.81
	Teacher Sensitivity	51	3	7	5.73	1.10
	Regard for Adolescent Perspectives (6-12)	51	2	6	4.67	0.99
	Instructional Learning Formats	51	3	7	5.63	1.02
	Analysis and Problem Solving (4-12)	51	3	7	5.14	1.15
High School	Differentiation Composite	44	2.50	6.75	4.85	1.08
	Teacher Sensitivity	43	3	7	5.09	1.11
	Regard for Adolescent Perspectives (6-12)	44	2	7	4.70	1.25
	Instructional Learning Formats	44	2	7	5.02	1.17
	Analysis and Problem Solving (4-12)	43	2	7	4.56	1.50
Total	Differentiation Composite	212	2.50	7.00	4.99	0.96
	Teacher Sensitivity	211	3	7	5.55	1.13
	Regard for Student Perspectives (K-5)	115	2	7	4.54	1.31
	Regard for Adolescent Perspectives (6-12)	95	2	7	4.68	1.11
	Instructional Learning Formats	209	2	7	5.37	1.10
	Concept Development (K-3)	79	1	7	4.05	1.37
	Analysis and Problem Solving (4-12)	130	2	7	4.65	1.39

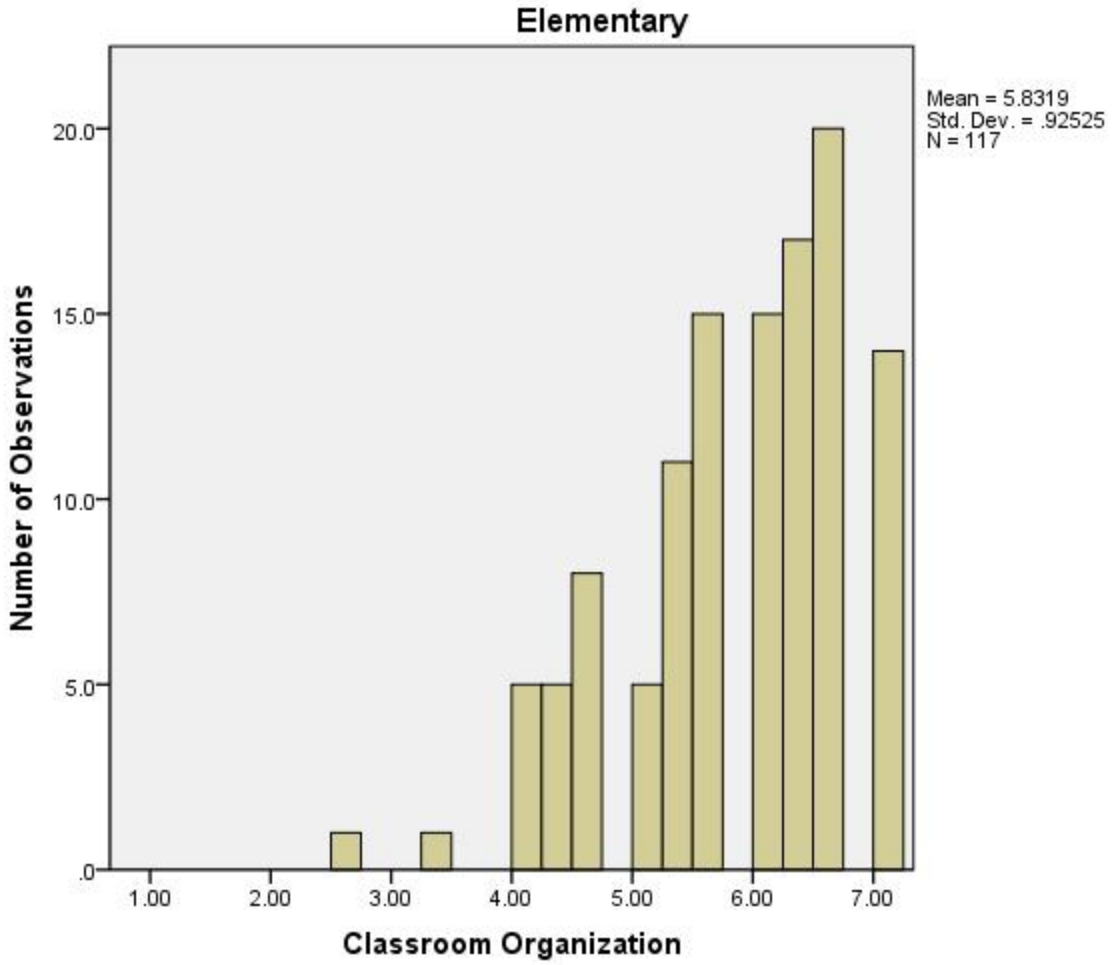


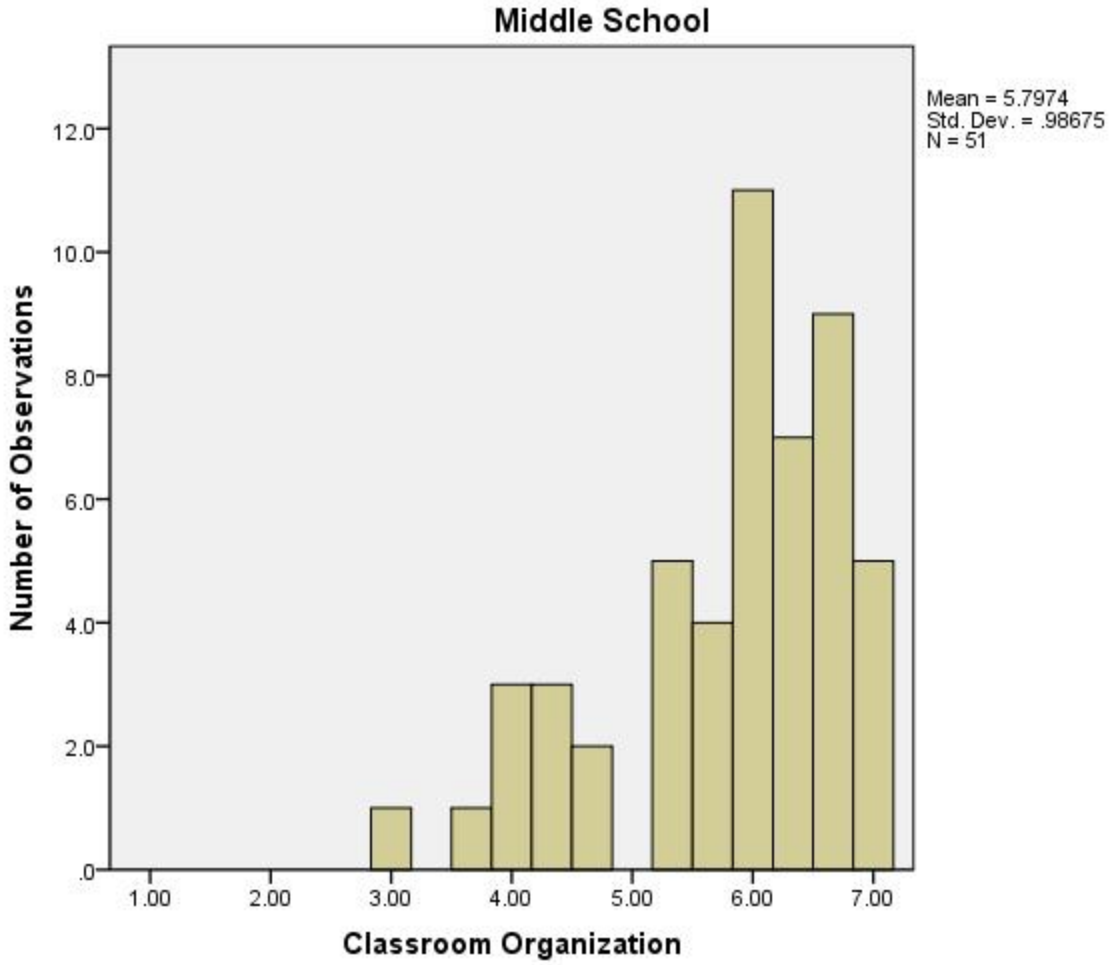

Elementary
Mean = 5.614
Std. Dev. = .86952
N = 117
Number of Observations
20.0
15.0
10.0
5.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Emotional Support

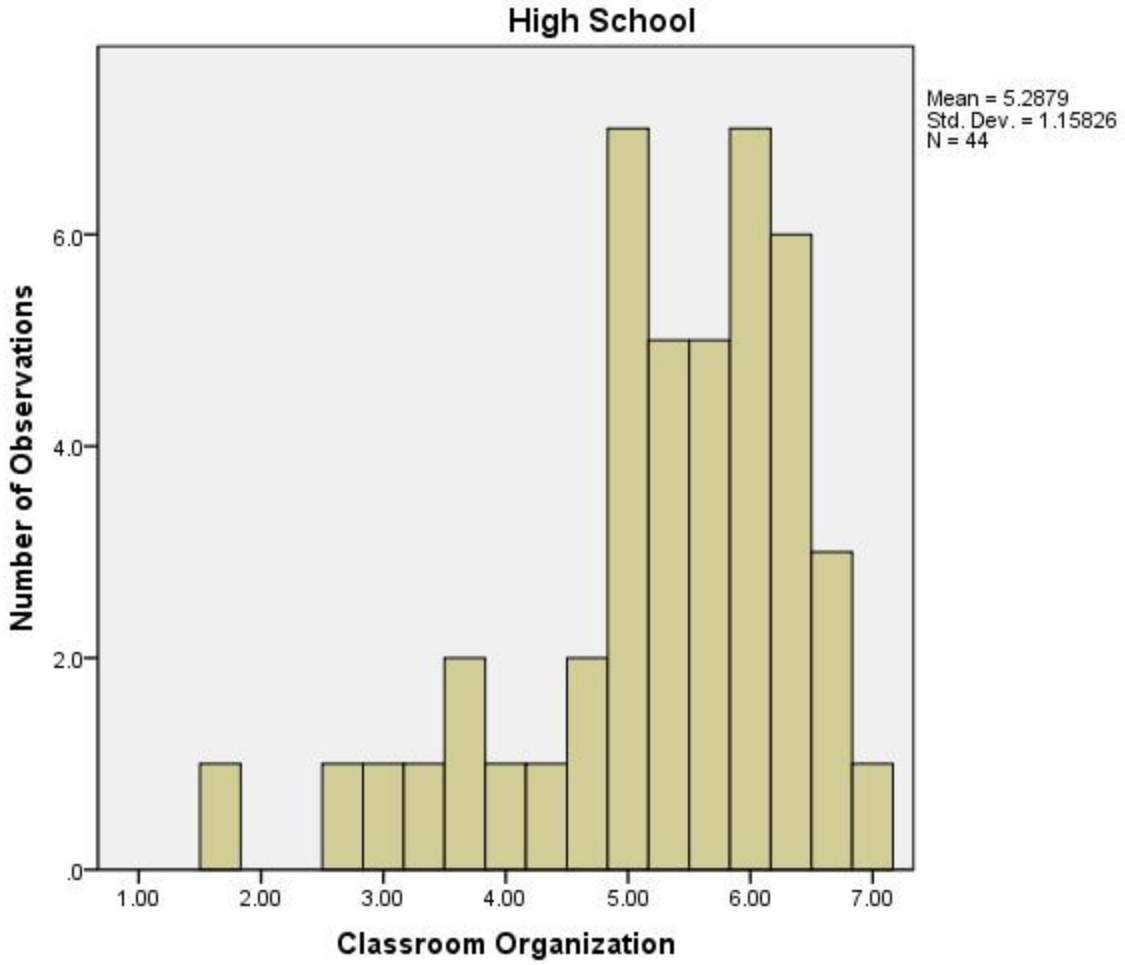

Middle School
Mean = 5.6127
Std. Dev. = .80671
N = 51
Number of Observations
15.0
10.0
5.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Emotional Support

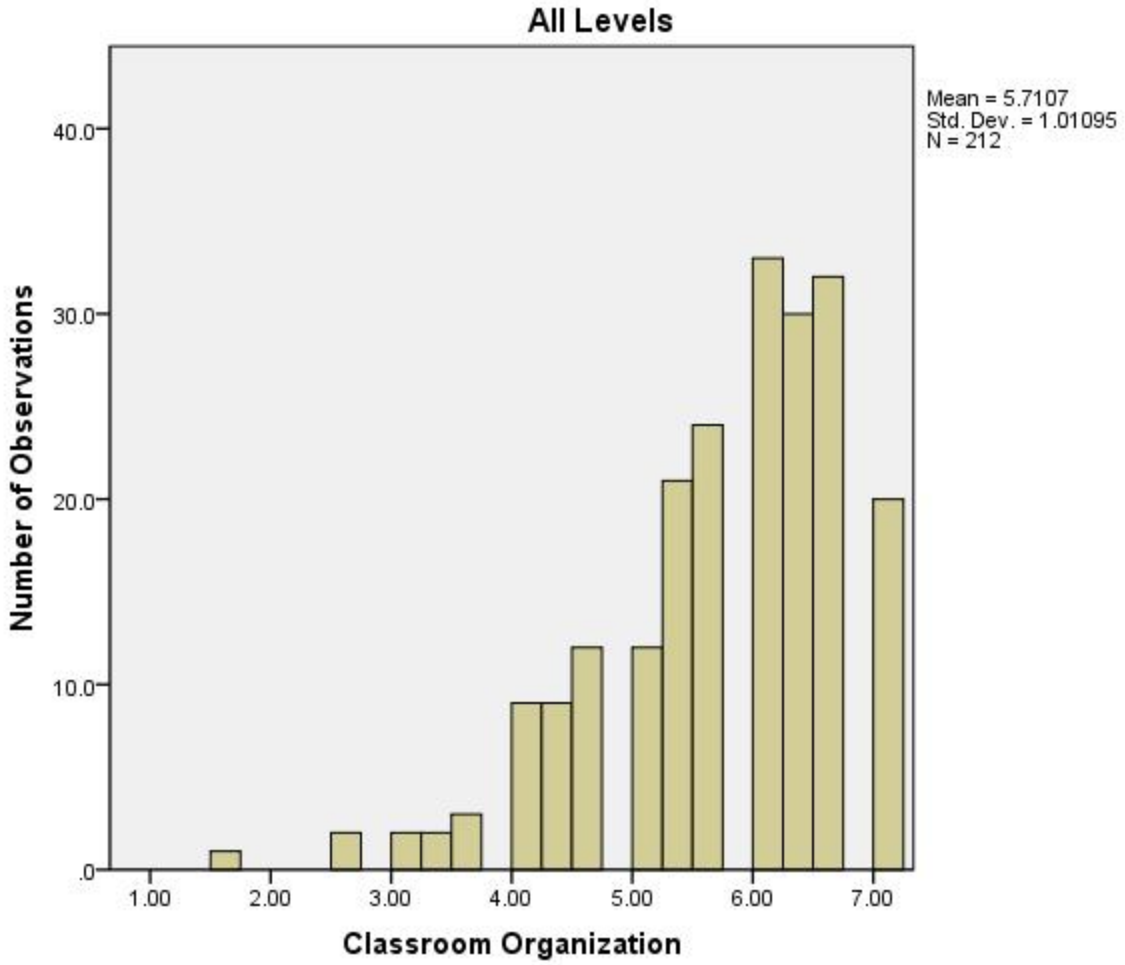

High School
Mean = 5.517
Std. Dev. = .82016
N = 44
Number of Observations
6.0
5.0
4.0
3.0
2.0
1.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Emotional Support

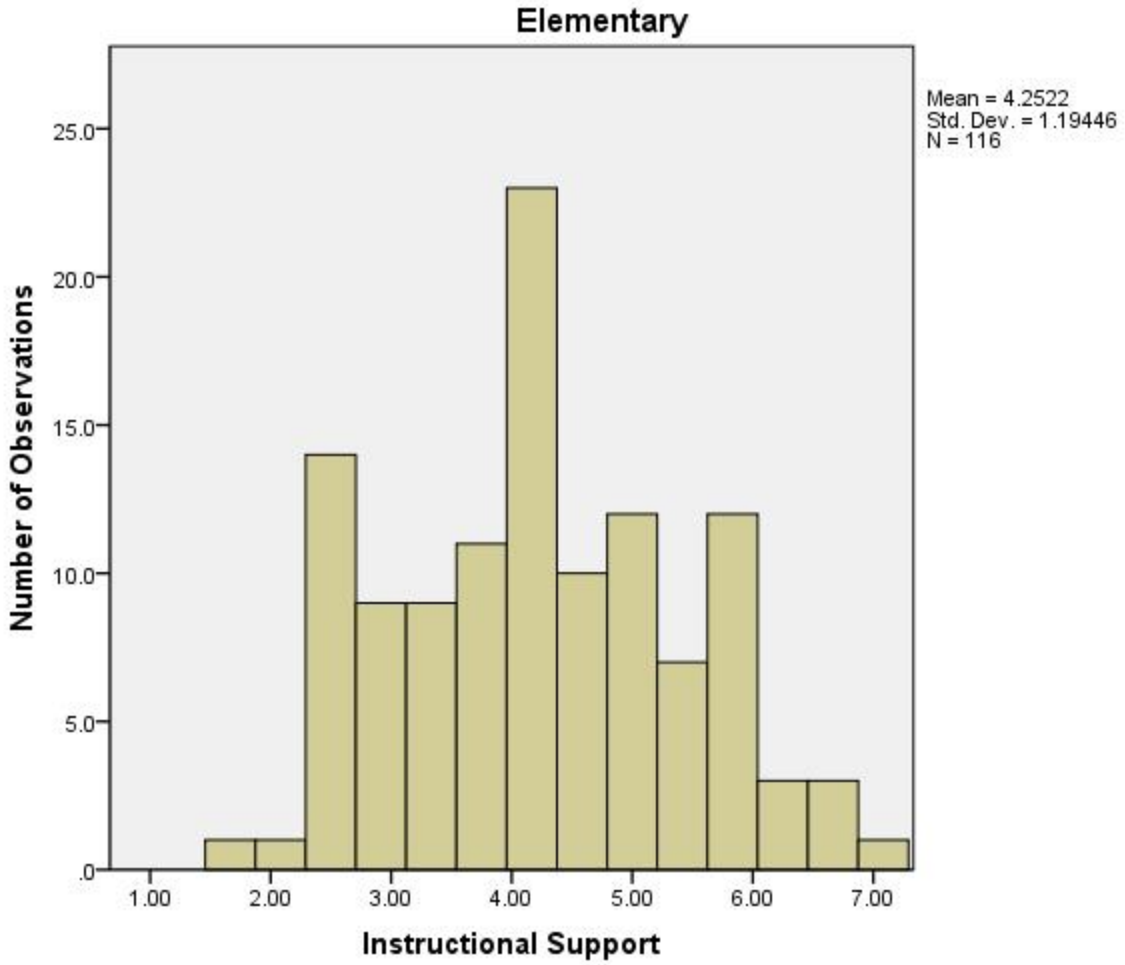

All Levels
Mean = 5.5936
Std. Dev. = .84172
N = 212
Number of Observations
30.0
20.0
10.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Emotional Support

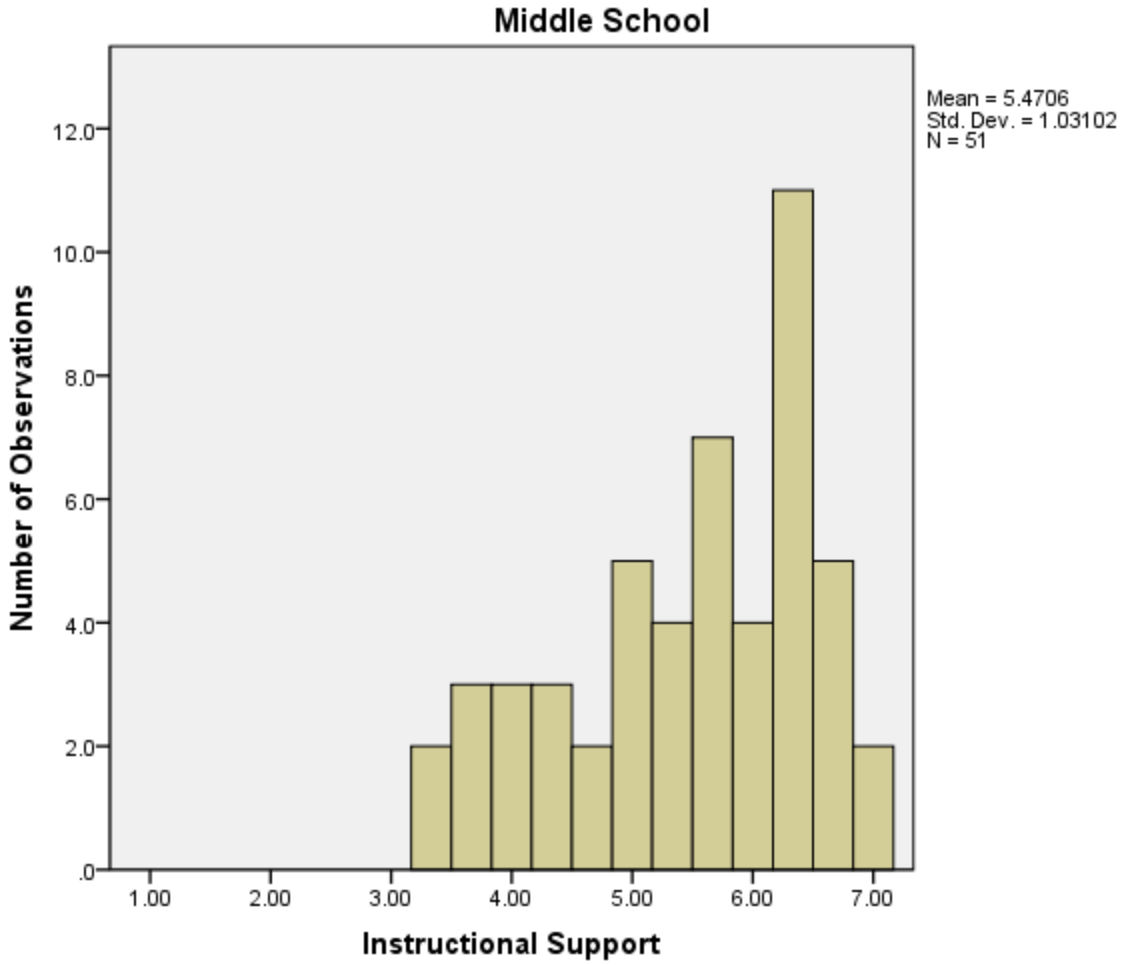

Elementary
Mean = 5.8319
Std. Dev. = .92525
N = 117
Number of Observations
20.0
15.0
10.0
5.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Classroom Organization

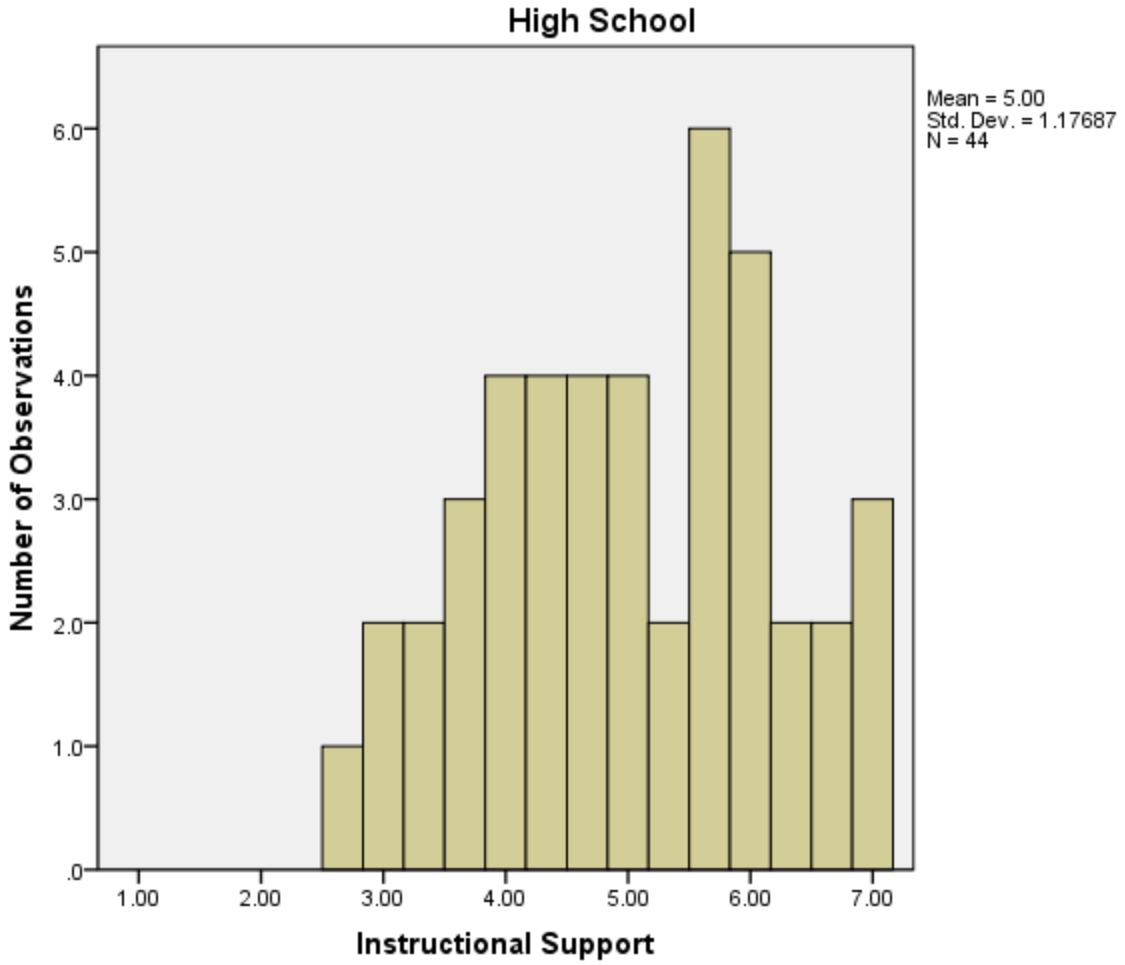

Middle School
Mean = 5.7974
Std. Dev. = .98675
N = 51
Number of Observations
12.0
10.0
8.0
6.0
4.0
2.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Classroom Organization

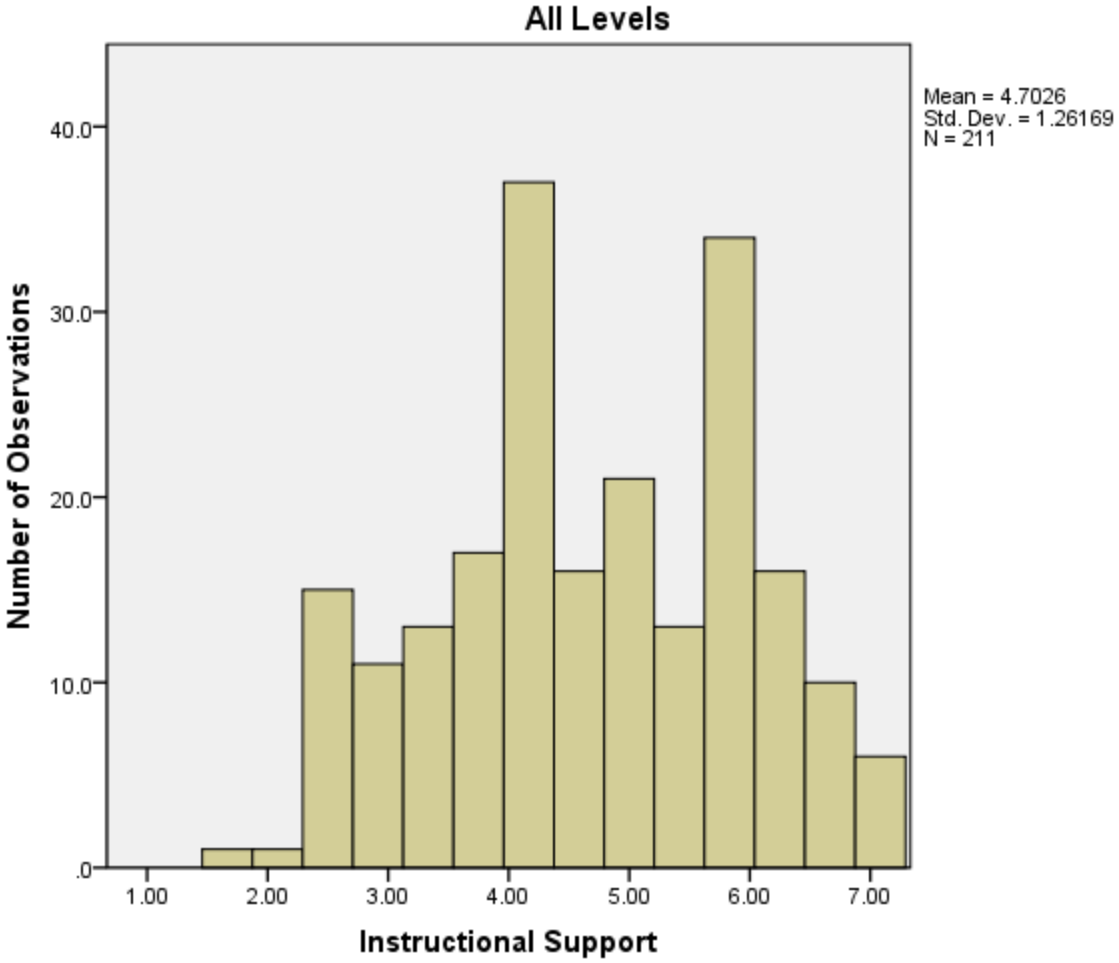

High School
Mean = 5.2879
Std. Dev. = 1.15826
N = 44
Number of Observations
6.0
4.0
2.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Classroom Organization

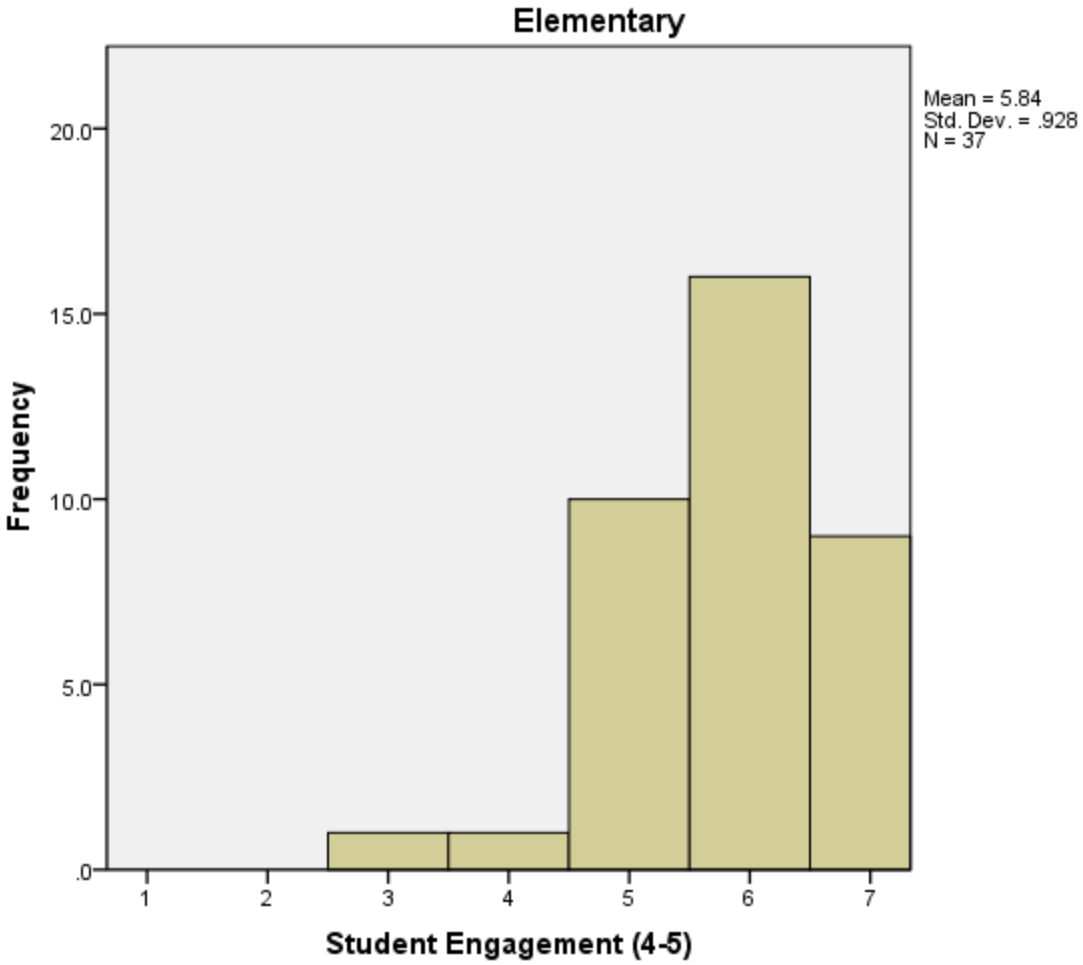

All Levels
Mean = 5.7107
Std. Dev. = 1.01095
N = 212
Number of Observations
40.0
30.0
20.0
10.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Classroom Organization

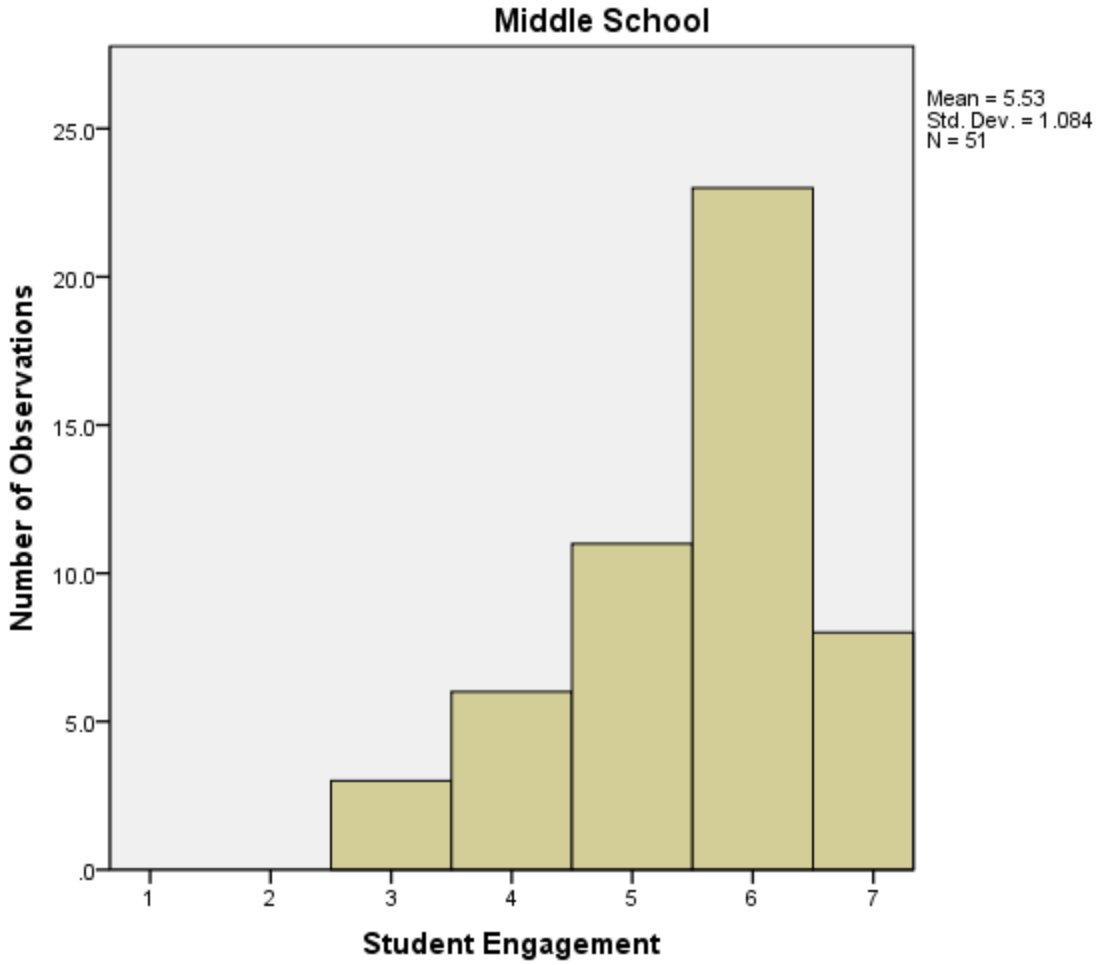

Elementary
Mean = 4.2522
Std. Dev. = 1.19446
N = 116
Number of Observations
25.0
20.0
15.0
10.0
5.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Instructional Support

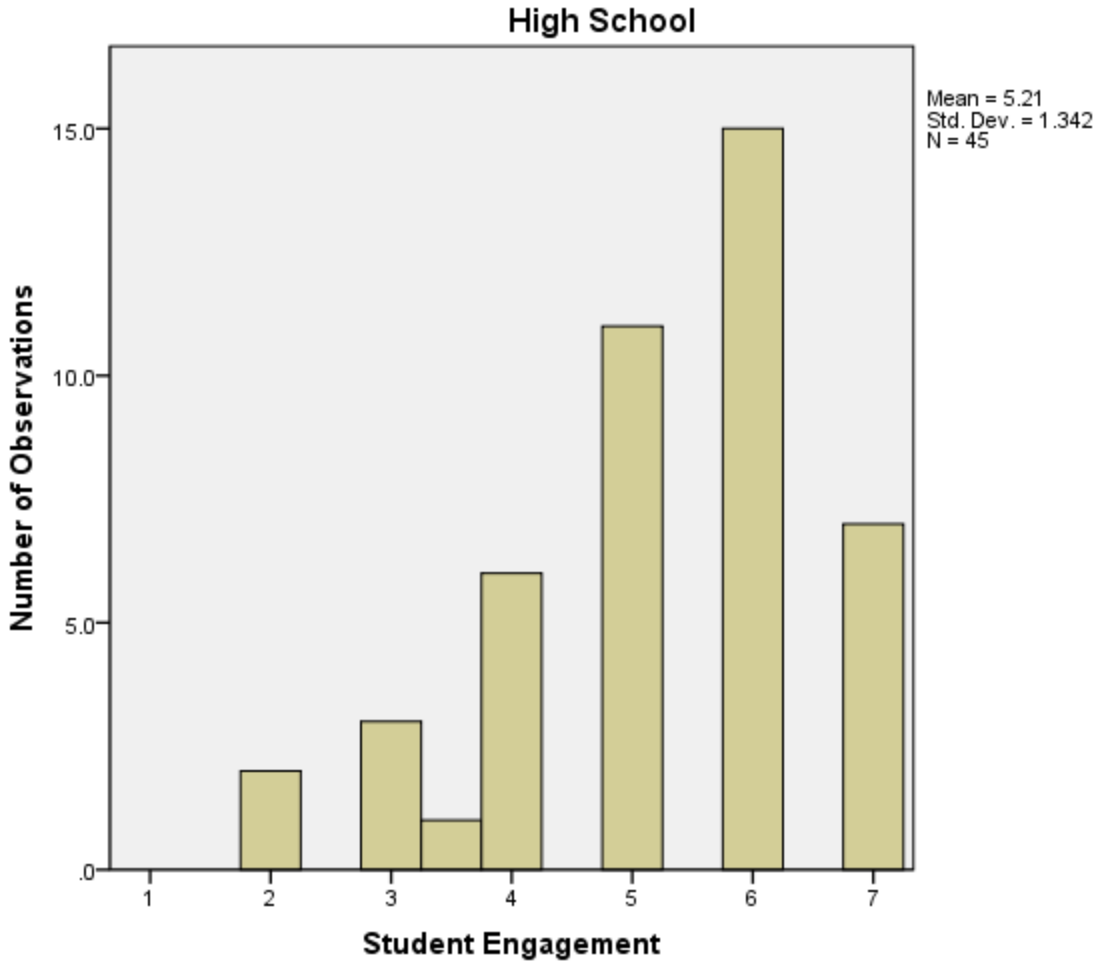

Middle School
Mean = 5.4706
Std. Dev. = 1.03102
N = 51
Number of Observations
12.0
10.0
8.0
6.0
4.0
2.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Instructional Support

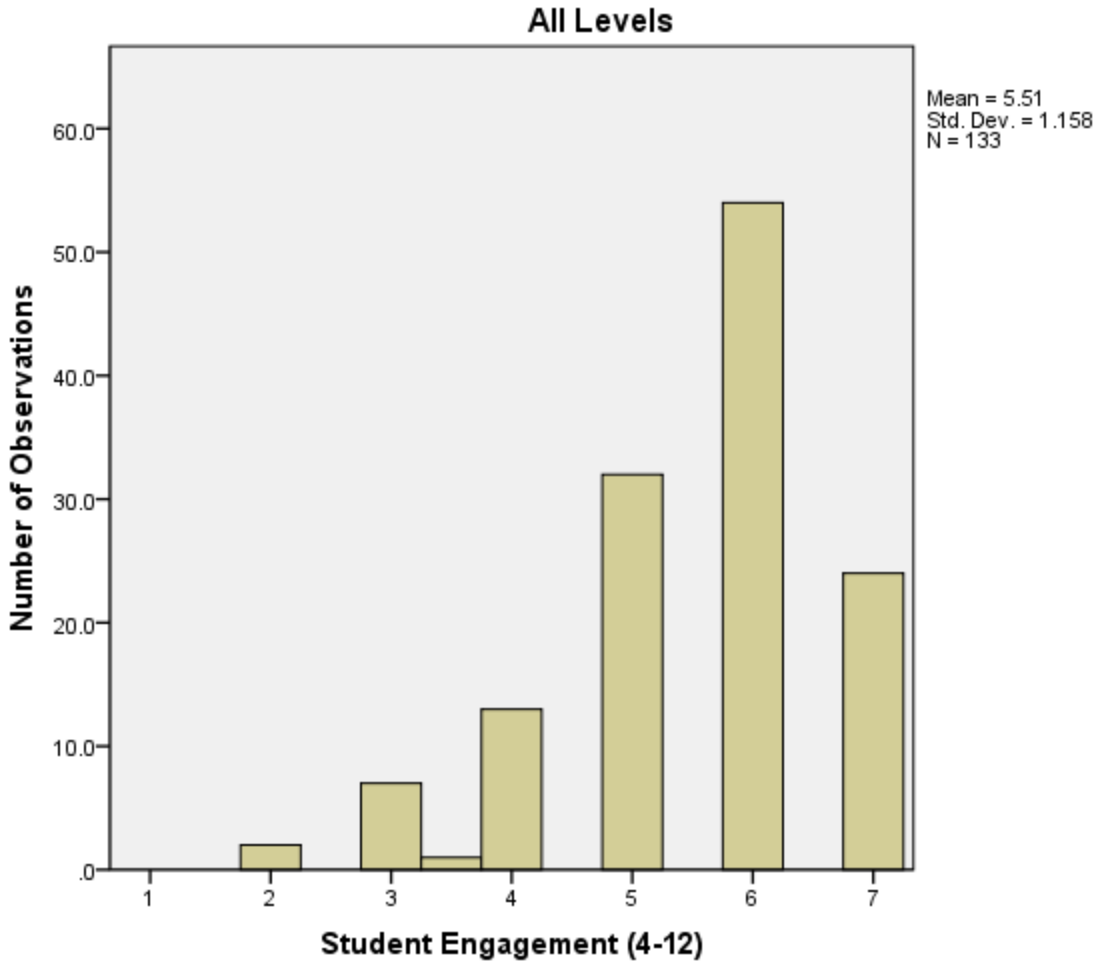

High School
Mean = 5.00
Std. Dev. = 1.17687
N = 44
Number of Observations
6.0
5.0
4.0
3.0
2.0
1.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Instructional Support

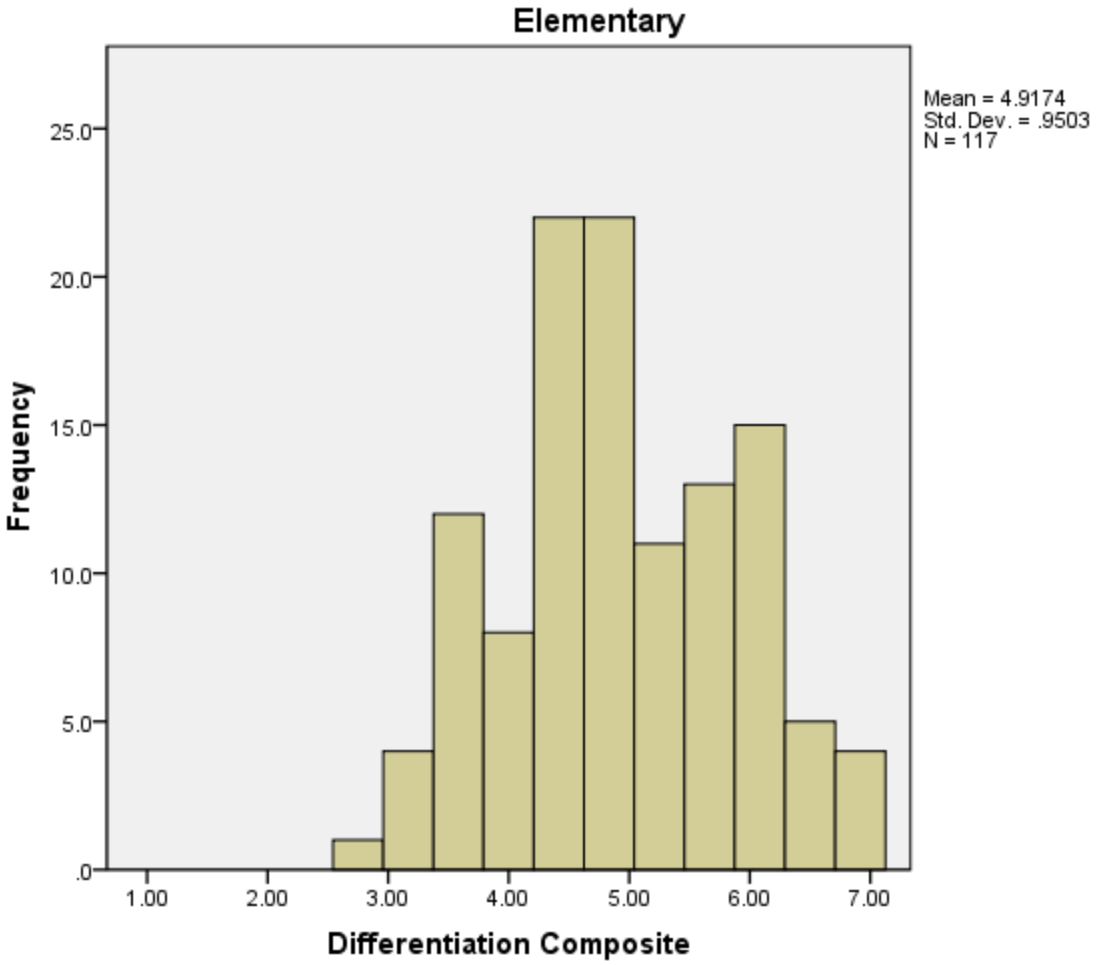

All Levels
Mean = 4.7026
Std. Dev. = 1.26169
N = 211
Number of Observations
40.0
30.0
20.0
10.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Instructional Support

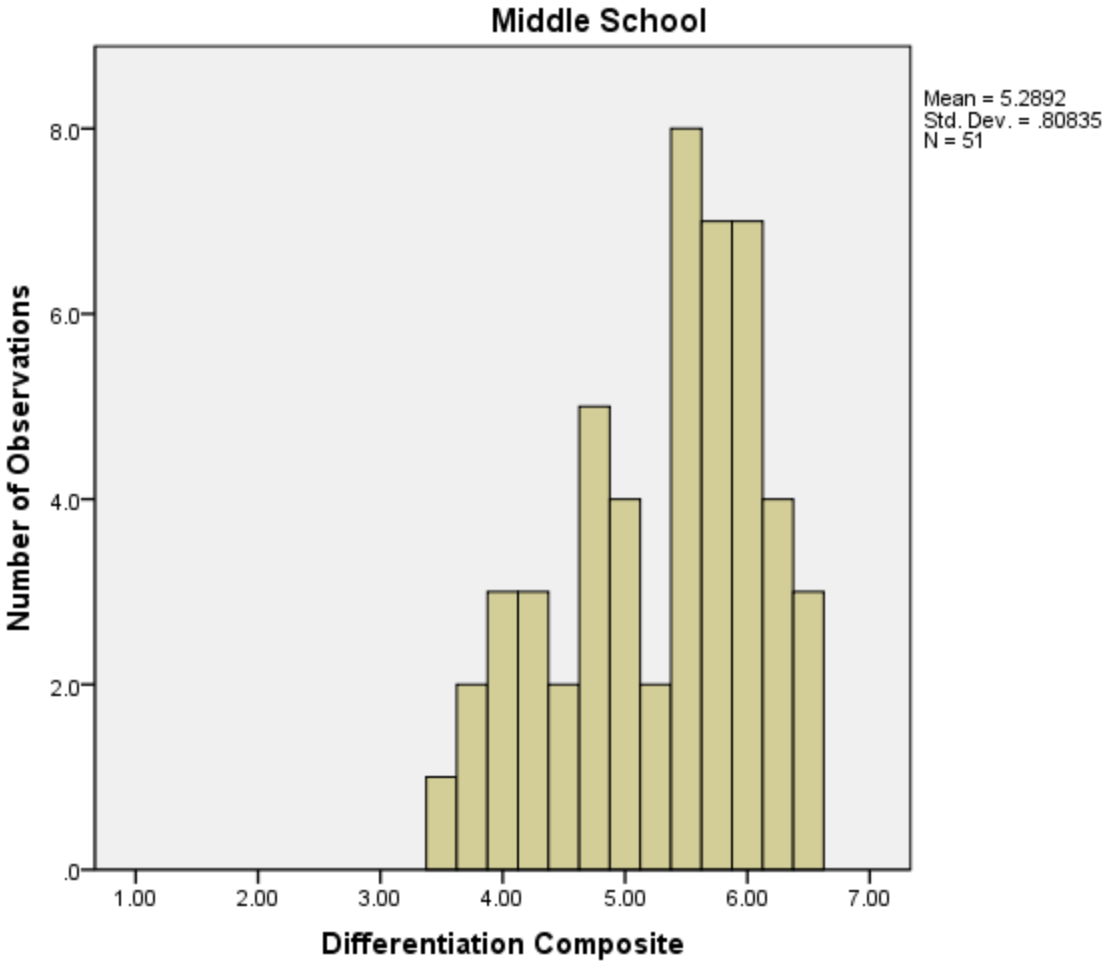

Elementary
Mean = 5.84
Std. Dev. = .928
N = 37
Frequency
20.0
15.0
10.0
5.0
.0
1
2
3
4
5
6
7
Student Engagement (4-5)

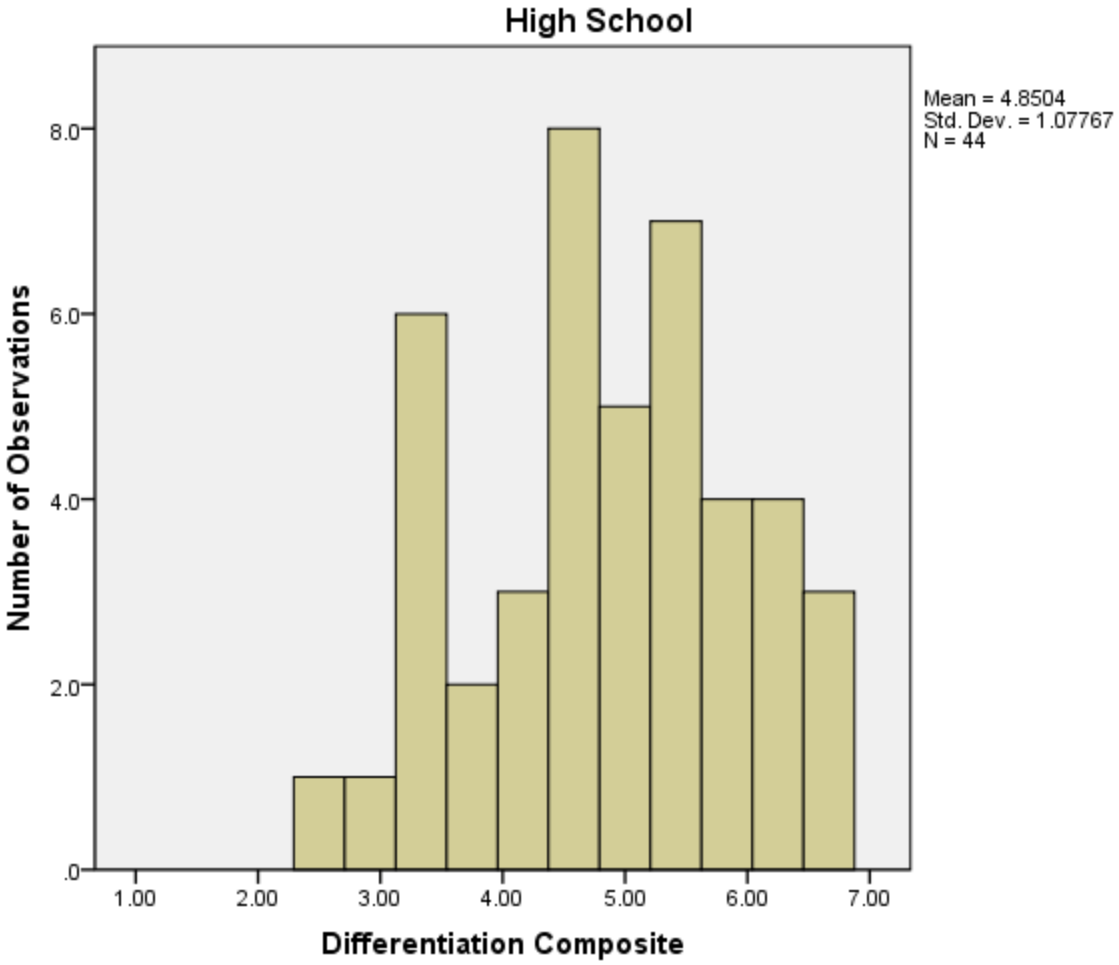

Middle School
Mean = 5.53
Std. Dev. = 1.084
N = 51
Number of Observations
25.0
20.0
15.0
10.0
5.0
.0
1
2
3
4
5
6
7
Student Engagement

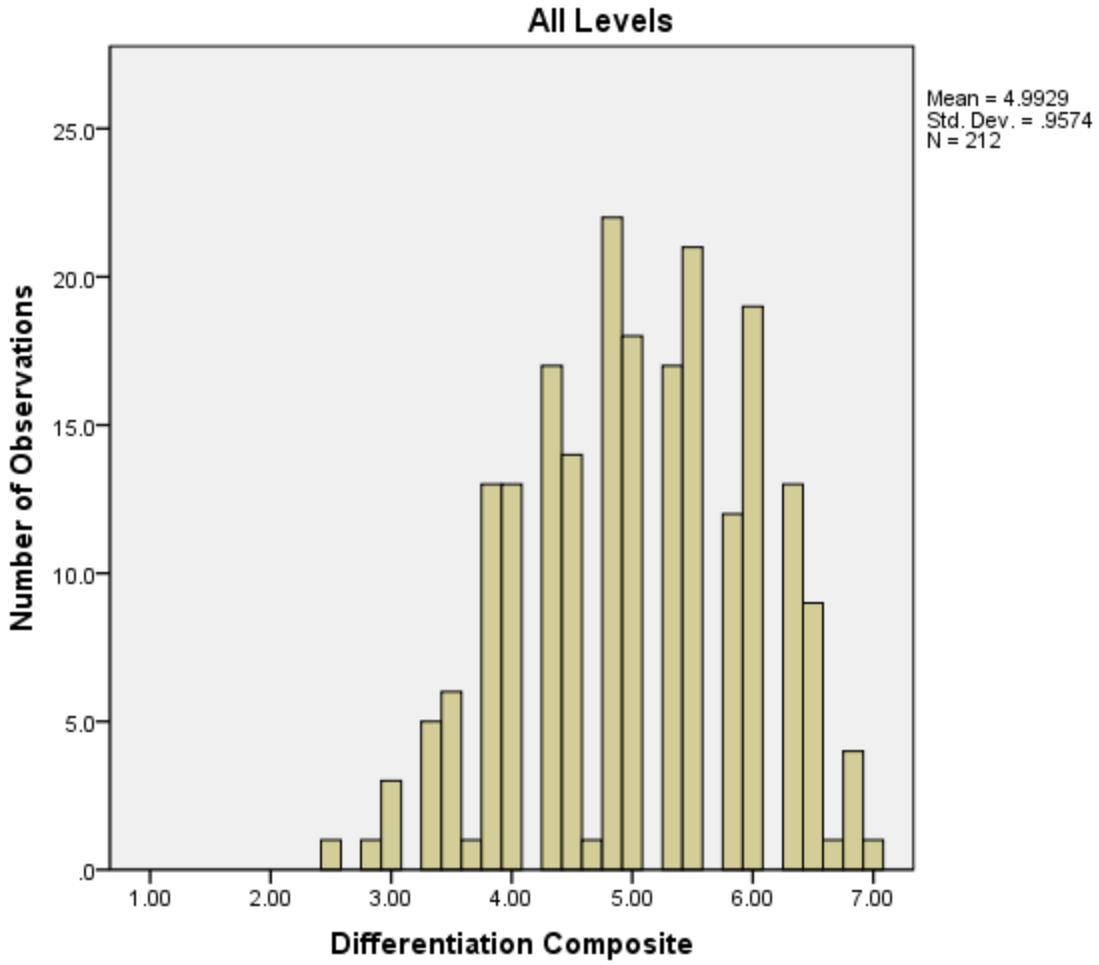

High School
Mean = 5.21
Std. Dev. = 1.342
N = 45
Number of Observations
15.0
10.0
5.0
.0
1
2
3
4
5
6
7
Student Engagement


All Levels
Mean = 5.51
Std. Dev. = 1.158
N = 133
Number of Observations
60.0
50.0
40.0
30.0
20.0
10.0
.0
1
2
3
4
5
6
7
Student Engagement (4-12)


Elementary
Mean = 4.9174
Std. Dev. = .9503
N = 117
Frequency
25.0
20.0
15.0
10.0
5.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Differentiation Composite


Middle School
Mean = 5.2892
Std. Dev. = .80835
N = 51
Number of Observations
8.0
6.0
4.0
2.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Differentiation Composite

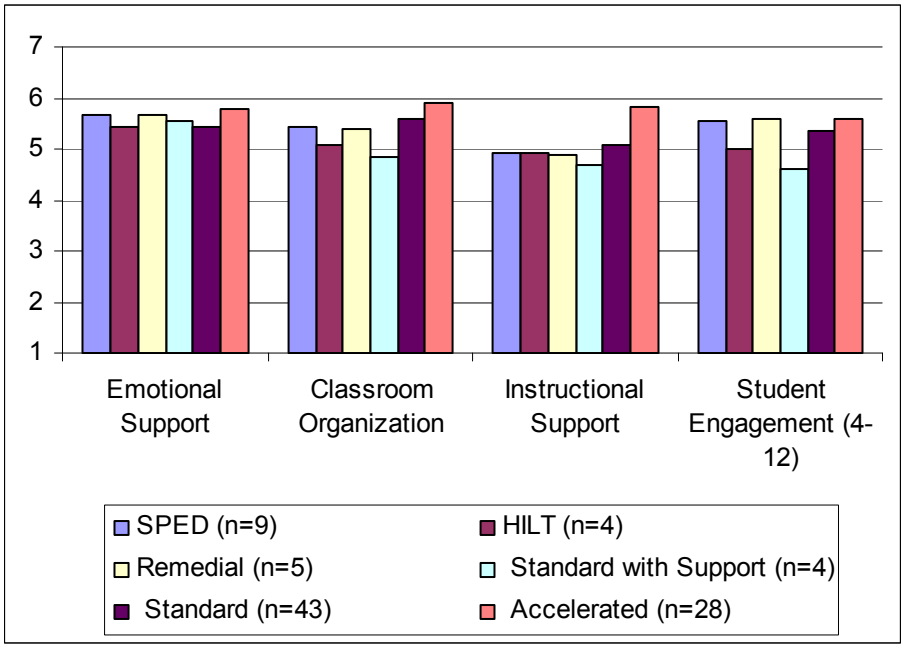

High School
Mean = 4.8504
Std. Dev. = 1.07767
N = 44
Number of Observations
8.0
6.0
4.0
2.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Differentiation Composite


All Levels
Mean = 4.9929
Std. Dev. = .9574
N = 212
Number of Observations
25.0
20.0
15.0
10.0
5.0
.0
1.00
2.00
3.00
4.00
5.00
6.00
7.00
Differentiation Composite

Secondary CLASS Results for Mathematics Instruction, by Course Type, 2010-11

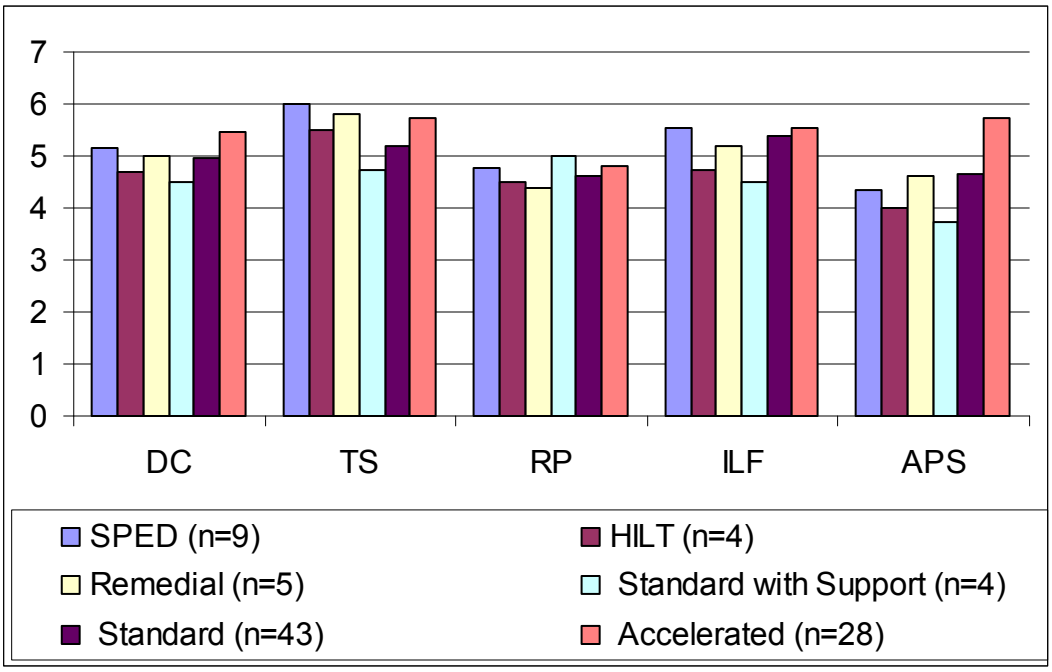
Course Type	Dimension/Domain	N	Minimum	Maximum	Mean	Std. Deviation
SPED	Emotional Support	9	3.75	6.75	5.67	1.17
	Positive Climate	9	3	7	5.44	1.51
	Negative Climate	9	1	3	1.56	0.88
	Teacher Sensitivity	9	4	7	6.00	1.22
	Regard for Adolescent Perspectives (6-12)	9	2	6	4.78	1.48
	Classroom Organization	9	3.67	6.67	5.44	1.19
	Behavior Management	9	3	7	5.56	1.51
	Productivity	9	3	7	5.22	1.30
	Instructional Learning Formats	9	4	7	5.56	1.01
	Instructional Support	9	3.33	6.67	4.93	1.19
	Content Understanding (4-12)	9	3	7	4.89	1.45
	Analysis and Problem Solving (4-12)	9	3	6	4.33	1.12
	Quality of Feedback (all grades)	9	4	7	5.56	1.24
	Student Engagement (4-12)	9	3	7	5.56	1.42
HILT	Emotional Support	4	4.00	6.25	5.44	1.01
	Positive Climate	4	4	6	5.25	0.96
	Negative Climate	4	1	2	1.50	0.58
	Teacher Sensitivity	4	3	7	5.50	1.91
	Regard for Adolescent Perspectives (6-12)	4	3	6	4.50	1.29
	Classroom Organization	4	1.67	6.67	5.08	2.32
	Behavior Management	4	1	7	5.00	2.71
	Productivity	4	2	7	5.50	2.38
	Instructional Learning Formats	4	2	6	4.75	1.89
	Instructional Support	4	2.67	6.33	4.92	1.57
	Content Understanding (4-12)	4	2	7	5.25	2.22
	Analysis and Problem Solving (4-12)	4	2	6	4.00	1.63
	Quality of Feedback (all grades)	4	4	6	5.50	1.00
	Student Engagement (4-12)	4	2	7	5.00	2.16
Remedial	Emotional Support	5	4.00	6.50	5.65	0.96
	Positive Climate	5	4	7	5.80	1.10
	Negative Climate	5	1	3	1.40	0.89
	Teacher Sensitivity	5	4	7	5.80	1.10
	Regard for Adolescent Perspectives (6-12)	5	3	6	4.40	1.14
	Classroom Organization	5	3.00	6.67	5.40	1.42
	Behavior Management	5	3	7	5.60	1.52
	Productivity	5	3	7	5.40	1.52
	Instructional Learning Formats	5	3	6	5.20	1.30
	Instructional Support	5	3.33	6.67	4.87	1.39
	Content Understanding (4-12)	5	3	7	5.00	1.58
	Analysis and Problem Solving (4-12)	5	3	6	4.60	1.14
	Quality of Feedback (all grades)	5	3	7	5.00	1.58
	Student Engagement (4-12)	5	3	7	5.60	1.52
Standard with Support	Emotional Support	4	4.50	7.00	5.56	1.05
	Positive Climate	4	5	7	5.75	0.96
	Negative Climate	4	1	2	1.25	0.50
	Teacher Sensitivity	4	3	7	4.75	1.71
	Regard for Adolescent Perspectives (6-12)	4	4	7	5.00	1.41
	Classroom Organization	4	3.33	6.67	4.83	1.60
	Behavior Management	4	2	7	4.75	2.22
	Productivity	4	4	7	5.25	1.50
	Instructional Learning Formats	4	3	6	4.50	1.29
	Instructional Support	4	3.00	6.67	4.67	1.52
	Content Understanding (4-12)	4	4	7	5.50	1.29
	Analysis and Problem Solving (4-12)	4	2	6	3.75	1.71
	Quality of Feedback (all grades)	4	3	7	4.75	1.71
	Student Engagement (4-12)	4	4	6	4.63	1.11

Course Type	Dimension/Domain	N	Minimum	Maximum	Mean	Std. Deviation
Standard	Emotional Support	43	4.00	6.75	5.44	0.67
	Positive Climate	43	3	7	5.37	0.82
	Negative Climate	43	1	4	1.44	0.77
	Teacher Sensitivity	43	3	7	5.19	0.98
	Regard for Adolescent Perspectives (6-12)	43	3	6	4.63	1.07
	Classroom Organization	43	3.67	7.00	5.57	0.78
	Behavior Management	43	4	7	5.58	0.91
	Productivity	43	3	7	5.77	0.95
	Instructional Learning Formats	43	3	7	5.37	0.95
	Instructional Support	43	3.00	7.00	5.09	0.97
	Content Understanding (4-12)	43	3	7	5.35	1.07
	Analysis and Problem Solving (4-12)	42	2	7	4.67	1.18
	Quality of Feedback (all grades)	42	3	7	5.31	1.14
	Student Engagement (4-12)	44	3	7	5.36	0.97
Accelerated	Emotional Support	28	4.25	6.75	5.79	0.76
	Positive Climate	28	4	7	5.86	1.04
	Negative Climate	27	1	3	1.30	0.54
	Teacher Sensitivity	27	4	7	5.74	1.10
	Regard for Adolescent Perspectives (6-12)	28	3	6	4.82	0.94
	Classroom Organization	28	3.00	7.00	5.89	1.04
	Behavior Management	28	4	7	5.96	1.10
	Productivity	28	3	7	6.18	1.06
	Instructional Learning Formats	28	2	7	5.54	1.20
	Instructional Support	28	3.67	7.00	5.83	0.98
	Content Understanding (4-12)	28	3	7	5.86	1.11
	Analysis and Problem Solving (4-12)	28	3	7	5.71	1.24
	Quality of Feedback (all grades)	28	3	7	5.93	1.02
	Student Engagement (4-12)	28	3	7	5.61	1.23
Total	Emotional Support	212	3.00	7.00	5.59	0.84
	Positive Climate	212	2	7	5.54	1.15
	Negative Climate	211	1	7	1.33	0.73
	Teacher Sensitivity	211	3	7	5.55	1.13
	Regard for Student Perspectives (K-5)	115	2	7	4.54	1.31
	Regard for Adolescent Perspectives (6-12)	95	2	7	4.68	1.11
	Classroom Organization	212	1.67	7.00	5.71	1.01
	Behavior Management	212	1	7	5.88	1.21
	Productivity	212	2	7	5.87	1.15
	Instructional Learning Formats	209	2	7	5.37	1.10
	Instructional Support	211	1.67	7.00	4.70	1.26
	Content Understanding (4-12)	131	2	7	5.20	1.32
	Analysis and Problem Solving (4-12)	130	2	7	4.65	1.39
	Concept Development (K-3)	79	1	7	4.05	1.37
	Quality of Feedback (all grades)	210	2	7	4.94	1.34
	Language Modeling (K-3)	79	1	7	4.06	1.44
	Instructional Dialogue (4-5)	25	2	6	4.00	1.26
	Student Engagement (4-12)	133	2	7	5.51	1.16


7
6
5
4
3
2
1
Emotional Support
Classroom Organization
Instructional Support
Student Engagement (4-12)
SPED (n=9)
HILT (n=4)
Remedial (n=5)
Standard with Support (n=4)
Standard (n=43)
Accelerated (n=28)

CLASS Differentiation Composite for Mathematics Instruction, by Course Type, 2010-11

Course Type	Differentiation Composite	N	Minimum	Maximum	Mean	Std. Deviation
SPED	Differentiation Composite	9	3.75	6.25	5.17	0.99
	Teacher Sensitivity	9	4	7	6.00	1.22
	Regard for Adolescent Perspectives (6-12)	9	2	6	4.78	1.48
	Instructional Learning Formats	9	4	7	5.56	1.01
	Analysis and Problem Solving (4-12)	9	3	6	4.33	1.12
HILT	Differentiation Composite	4	2.50	6.00	4.69	1.55
	Teacher Sensitivity	4	3	7	5.50	1.91
	Regard for Adolescent Perspectives (6-12)	4	3	6	4.50	1.29
	Instructional Learning Formats	4	2	6	4.75	1.89
	Analysis and Problem Solving (4-12)	4	2	6	4.00	1.63
Remedial	Differentiation Composite	5	3.50	5.75	5.00	0.92
	Teacher Sensitivity	5	4	7	5.80	1.10
	Regard for Adolescent Perspectives (6-12)	5	3	6	4.40	1.14
	Instructional Learning Formats	5	3	6	5.20	1.30
	Analysis and Problem Solving (4-12)	5	3	6	4.60	1.14
Standard with Support	Differentiation Composite	4	3.25	6.50	4.50	1.49
	Teacher Sensitivity	4	3	7	4.75	1.71
	Regard for Adolescent Perspectives (6-12)	4	4	7	5.00	1.41
	Instructional Learning Formats	4	3	6	4.50	1.29
	Analysis and Problem Solving (4-12)	4	2	6	3.75	1.71
Standard	Differentiation Composite	43	3.25	6.50	4.96	0.81
	Teacher Sensitivity	43	3	7	5.19	0.98
	Regard for Adolescent Perspectives (6-12)	43	3	6	4.63	1.07
	Instructional Learning Formats	43	3	7	5.37	0.95
	Analysis and Problem Solving (4-12)	42	2	7	4.67	1.18
Accelerated	Differentiation Composite	28	3.50	6.75	5.46	0.93
	Teacher Sensitivity	27	4	7	5.74	1.10
	Regard for Adolescent Perspectives (6-12)	28	3	6	4.82	0.94
	Instructional Learning Formats	28	2	7	5.54	1.20
	Analysis and Problem Solving (4-12)	28	3	7	5.71	1.24
Total	Differentiation Composite	212	2.50	7.00	4.99	0.96
	Teacher Sensitivity	211	3	7	5.55	1.13
	Regard for Student Perspectives (K-5)	115	2	7	4.54	1.31
	Regard for Adolescent Perspectives (6-12)	95	2	7	4.68	1.11
	Instructional Learning Formats	209	2	7	5.37	1.10
	Concept Development (K-3)	79	1	7	4.05	1.37
	Analysis and Problem Solving (4-12)	130	2	7	4.65	1.39


7
6
5
4
3
2
1
0
DC
TS
RP
ILF
APS
SPED (n=9)
HILT (n=4)
Remedial (n=5)
Standard with Support (n=4)
Standard (n=43)
Accelerated (n=28)

Math Checklist Results, 2010-11

New learning was connected to previous learning.			
Level		N	Percent
Elementary	Inadequate	4	6.3
	Acceptable	31	48.4
	Exemplary	29	45.3
	Total	64	100.0
	Missing	12	
	Total	76	
Middle School	Inadequate	5	29.4
	Acceptable	11	64.7
	Exemplary	1	5.9
	Total	17	100.0
	Missing	5	
	Total	22	
High School	Non-existent	1	3.8
	Inadequate	13	50.0
	Acceptable	8	30.8
	Exemplary	4	15.4
	Total	26	100.0
	Missing	4	
	Total	30	

The mathematical content presented was accurate.			
Level		N	Percent
Elementary	Inadequate	2	3.2
	Acceptable	5	7.9
	Exemplary	56	88.9
	Total	63	100.0
	Missing	13	
	Total	76	
Middle School	Inadequate	1	5.9
	Acceptable	5	29.4
	Exemplary	11	64.7
	Total	17	100.0
	Missing	5	
	Total	22	
High School	Inadequate	3	11.5
	Acceptable	6	23.1
	Exemplary	17	65.4
	Total	26	100.0
	Missing	4	
	Total	30	

Precise and accurate mathematical language and vocabulary appropriate to the grade level were included in the lesson.			
Level		N	Percent
Elementary	Inadequate	4	6.3
	Acceptable	32	50.0
	Exemplary	28	43.8
	Total	64	100.0
	Missing	12	
	Total	76	
Middle School	Inadequate	2	11.8
	Acceptable	10	58.8
	Exemplary	5	29.4
	Total	17	100.0
	Missing	5	
	Total	22	
High School	Non-existent	1	3.8
	Inadequate	5	19.2
	Acceptable	16	61.5
	Exemplary	4	15.4
	Total	26	100.0
	Missing	4	
	Total	30	

Students were engaged in discourse about mathematical concepts.			
Level		N	Percent
Elementary	Non-existent	3	4.7
	Inadequate	16	25.0
	Acceptable	27	42.2
	Exemplary	18	28.1
	Total	64	100.0
	Missing	12	
	Total	76	
Middle School	Non-existent	3	17.6
	Inadequate	6	35.3
	Acceptable	6	35.3
	Exemplary	2	11.8
	Total	17	100.0
	Missing	5	
	Total	22	
High School	Non-existent	10	38.5
	Inadequate	8	30.8
	Acceptable	7	26.9
	Exemplary	1	3.8
	Total	26	100.0
	Missing	4	
	Total	30	

What was the cognitive complexity of the task or assignment?			
Level		N	Percent
Elementary	Remember	3	4.6
	Understand	15	23.1
	Apply	36	55.4
	Analyze	9	13.8
	Evaluate	1	1.5
	Create	1	1.5
	Total	65	100.0
	Missing	11	
	Total	76	
Middle School	Remember	5	29.4
	Understand	5	29.4
	Apply	6	35.3
	Analyze	1	5.9
	Total	17	100.0
	Missing	5	
	Total	22	
High School	Remember	11	42.3
	Understand	7	26.9
	Apply	5	19.2
	Analyze	3	11.5
	Total	26	100.0
	Missing	4	
	Total	30	

The lesson was effective in further deepening the students' understanding of mathematics.			
Level		N	Percent
Elementary	Strongly agree	24	37.5
	Agree	31	48.4
	Neutral	9	14.1
	Total	64	100.0
	Missing	12	
	Total	76	
Middle School	Strongly agree	2	11.8
	Agree	3	17.6
	Neutral	9	52.9
	Disagree	3	17.6
	Total	17	100.0
	Missing	5	
	Total	22	
High School	Strongly agree	3	11.5
	Agree	9	34.6
	Neutral	10	38.5
	Disagree	4	15.4
	Total	26	100.0
	Missing	4	
	Total	30	

Math Checklist Results, Technologies Used, 2010-11

	Teachers		Students	
Calculators				
Level	N	Percent	N	Percent
Elementary (n=64)	0	0.0%	0	0.0%
Middle School (n=17)	0	0.0%	4	23.5%
High School (n=26)	2	7.7%	15	57.7%

Computers/Ipads				
Level	N	Percent	N	Percent
Elementary (n=64)	3	4.7%	3	4.7%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	2	7.7%	1	3.8%

Electronic presentation Board				
Level	N	Percent	N	Percent
Elementary (n=64)	9	14.1%	3	4.7%
Middle School (n=17)	6	35.3%	1	5.9%
High School (n=26)	7	26.9%	1	3.8%

LCD projector				
Level	N	Percent	N	Percent
Elementary (n=64)	1	1.6%	0	0.0%
Middle School (n=17)	1	5.9%	0	0.0%
High School (n=26)	0	0.0%	0	0.0%

Overhead projector				
Level	N	Percent	N	Percent
Elementary (n=64)	7	10.9%	0	0.0%
Middle School (n=17)	2	11.8%	1	5.9%
High School (n=26)	0	0.0%	0	0.0%

Document Reader				
Level	N	Percent	N	Percent
Elementary (n=64)	4	6.3%	0	0.0%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	0	0.0%	0	0.0%

Senteos/Smart Response				
Level	N	Percent	N	Percent
Elementary (n=64)	0	0.0%	0	0.0%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	0	0.0%	0	0.0%

"Airliners"/interactive slates				
Level	N	Percent	N	Percent
Elementary (n=64)	0	0.0%	0	0.0%
Middle School (n=17)	3	17.6%	0	0.0%
High School (n=26)	0	0.0%	0	0.0%

	Teachers		Students	
	TI Presenter or TI Viewscreen			
Level	N	Percent	N	Percent
Elementary (n=64)	0	0.0%	0	0.0%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	1	3.8%	1	3.8%

		Probeware		
Level	N	Percent	N	Percent
Elementary (n=64)	0	0.0%	0	0.0%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	0	0.0%	0	0.0%

		Smart Notebook-static features		
Level	N	Percent	N	Percent
Elementary (n=64)	13	20.3%	3	4.7%
Middle School (n=17)	6	35.3%	2	11.8%
High School (n=26)	16	61.5%	7	26.9%

		Smart Notebook-dynamic features		
Level	N	Percent	N	Percent
Elementary (n=64)	11	17.2%	8	12.5%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	5	19.2%	4	15.4%

		Powerpoint		
Level	N	Percent	N	Percent
Elementary (n=64)	2	3.1%	1	1.6%
Middle School (n=17)	1	5.9%	0	0.0%
High School (n=26)	0	0.0%	1	3.8%

		Video clips		
Level	N	Percent	N	Percent
Elementary (n=64)	2	3.1%	0	0.0%
Middle School (n=17)	1	5.9%	0	0.0%
High School (n=26)	1	3.8%	0	0.0%

		websites/web math applications		
Level	N	Percent	N	Percent
Elementary (n=64)	3	4.7%	2	3.1%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	0	0.0%	0	0.0%

		Network math applications		
Level	N	Percent	N	Percent
Elementary (n=64)	0	0.0%	1	1.6%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	1	3.8%	0	0.0%

		Audio Enhancement		
Level	N	Percent	N	Percent
Elementary (n=64)	0	0.0%	0	0.0%
Middle School (n=17)	0	0.0%	0	0.0%
High School (n=26)	0	0.0%	0	0.0%

		other		
Level	N	Percent	N	Percent
Elementary (n=64)	0	0.0%	1	1.6%
Middle School (n=17)	2	11.8%	2	11.8%
High School (n=26)	1	3.8%	0	0.0%

Math Checklist Results, Lesson Elements, 2010-11

Lesson Elements	Level	N	Percent
Inquiry-based or discovery learning	Elementary (n=64)	10	15.6%
	Middle School (n=17)	0	0.0%
	High School (n=26)	0	0.0%
Lecture	Elementary	5	7.8%
	Middle School	3	17.6%
	High School	4	15.4%
Student-student discourse	Elementary	16	25.0%
	Middle School	1	5.9%
	High School	3	11.5%
Guided practice	Elementary	30	46.9%
	Middle School	8	47.1%
	High School	17	65.4%
Independent practice	Elementary	25	39.1%
	Middle School	5	29.4%
	High School	8	30.8%
Pair or group work	Elementary	23	35.9%
	Middle School	4	23.5%
	High School	8	30.8%
Visuals, diagrams or representations	Elementary	46	71.9%
	Middle School	7	41.2%
	High School	13	50.0%
Manipulatives	Elementary	32	50.0%
	Middle School	3	17.6%
	High School	3	11.5%
Student writing about mathematics	Elementary	10	15.6%
	Middle School	1	5.9%
	High School	2	7.7%
Problems in context	Elementary	10	15.6%
	Middle School	5	29.4%
	High School	5	19.2%
Closure	Elementary	4	6.3%
	Middle School	0	0.0%
	High School	0	0.0%
Formal Assessment (test or quiz)	Elementary	3	4.7%
	Middle School	2	11.8%
	High School	3	11.5%

Secondary Mathematics Enrollment by Course Type, 2006-07 through 2010-11 (based on number of enrollments)

Level	Course Type	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
Middle School	SPED	381	10.4	337	8.7	328	8.4	277	6.9	253	5.9
	HILT	129	3.5	111	2.9	96	2.5	128	3.2	105	2.4
	Remedial	0	.0	1	.0	4	.1	1	.0	1	.0
	Extra Support	26	.7	57	1.5	106	2.7	75	1.9	206	4.8
	Grade-Level	1384	37.7	1666	43.0	1818	46.4	2015	49.9	2122	49.2
	Accelerated	1751	47.7	1698	43.9	1563	39.9	1541	38.2	1629	37.7
	Total	3671	100.0	3870	100.0	3915	100.0	4037	100.0	4316	100.0
High School	SPED	138	2.9	117	2.4	133	2.6	156	3.0	128	2.4
	HILT	151	3.2	147	3.0	128	2.5	120	2.3	81	1.5
	Remedial	44	.9	47	1.0	40	.8	38	.7	30	.6
	Extra Support	629	13.1	563	11.6	655	13.0	569	11.1	525	9.9
	Grade-Level	2076	43.3	2191	45.0	2120	42.0	2346	45.7	2561	48.1
	Accelerated	1751	36.6	1800	37.0	1966	39.0	1909	37.2	2004	37.6
	Total	4789	100.0	4865	100.0	5042	100.0	5138	100.0	5329	100.0
Total	SPED	519	6.1	454	5.2	461	5.1	433	4.7	381	4.0
	HILT	280	3.3	258	3.0	224	2.5	248	2.7	186	1.9
	Remedial	44	.5	48	.5	44	.5	39	.4	31	.3
	Extra Support	655	7.7	620	7.1	761	8.5	644	7.0	731	7.6
	Grade-Level	3460	40.9	3857	44.2	3938	44.0	4361	47.5	4683	48.6
	Accelerated	3502	41.4	3498	40.0	3529	39.4	3450	37.6	3633	37.7
	Total	8460	100.0	8735	100.0	8957	100.0	9175	100.0	9645	100.0

Middle School Mathematics Enrollment by Course Type and Grade Level, 2006-07 through 2010-11

Grade	Course Type	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
06	SPED	117	9.7	104	8.1	116	8.7	94	7.1	94	6.3
	HILT	55	4.6	43	3.3	33	2.5	51	3.8	48	3.2
	Extra Support	10	.8	20	1.6	28	2.1	16	1.2	70	4.7
	Grade-Level	576	47.9	698	54.1	777	57.9	805	60.8	885	59.2
	Accelerated	445	37.0	425	32.9	387	28.9	359	27.1	397	26.6
	Total	1203	100.0	1290	100.0	1341	100.0	1325	100.0	1494	100.0
07	SPED	133	10.6	109	8.6	117	8.7	91	6.5	79	5.6
	HILT	44	3.5	39	3.1	41	3.1	38	2.7	31	2.2
	Extra Support	16	1.3	34	2.7	63	4.7	42	3.0	95	6.8
	Grade-Level	449	35.6	528	41.8	605	45.1	729	51.7	706	50.2
	Accelerated	618	49.0	552	43.7	514	38.4	509	36.1	494	35.2
	Total	1260	100.0	1262	100.0	1340	100.0	1409	100.0	1405	100.0
08	SPED	131	10.9	124	9.4	95	7.7	92	7.1	80	5.6
	HILT	28	2.3	29	2.2	22	1.8	39	3.0	26	1.8
	Remedial	0	.0	1	.1	4	.3	1	.1	1	.1
	Extra Support	0	.0	3	.2	15	1.2	17	1.3	41	2.9
	Grade-Level	358	29.7	440	33.4	436	35.3	481	36.9	531	37.5
	Accelerated	689	57.1	721	54.7	662	53.6	673	51.7	738	52.1
	Total	1206	100.0	1318	100.0	1234	100.0	1303	100.0	1417	100.0
09	SPED	63	4.6	45	3.2	54	3.8	57	4.2	57	4.0
	HILT	107	7.7	102	7.2	88	6.1	67	4.9	41	2.9
	Remedial	32	2.3	31	2.2	27	1.9	25	1.8	20	1.4
	Extra Support	210	15.2	217	15.3	237	16.5	194	14.3	147	10.3
	Grade-Level	363	26.3	351	24.7	367	25.5	394	29.1	481	33.8
	Accelerated	607	43.9	673	47.4	664	46.2	619	45.6	678	47.6
	Total	1382	100.0	1419	100.0	1437	100.0	1356	100.0	1424	100.0
10	SPED	32	2.5	36	2.8	27	2.0	44	3.2	29	2.1
	HILT	26	2.0	19	1.5	14	1.0	22	1.6	18	1.3
	Remedial	10	.8	13	1.0	11	.8	12	.9	8	.6
	Extra Support	227	17.6	171	13.2	206	15.0	178	12.9	176	13.0
	Grade-Level	393	30.5	452	34.9	452	32.8	492	35.7	520	38.3
	Accelerated	600	46.6	605	46.7	667	48.4	631	45.8	607	44.7
	Total	1288	100.0	1296	100.0	1377	100.0	1379	100.0	1358	100.0
11	SPED	24	2.1	14	1.1	22	1.8	23	1.7	21	1.6
	HILT	5	.4	10	.8	6	.5	4	.3	3	.2
	Remedial	2	.2	2	.2	1	.1	1	.1	2	.1
	Extra Support	135	11.6	138	11.3	116	9.7	115	8.5	109	8.1
	Grade-Level	803	69.0	872	71.2	786	65.7	949	70.1	928	69.0
	Accelerated	195	16.8	189	15.4	266	22.2	262	19.4	282	21.0
	Total	1164	100.0	1225	100.0	1197	100.0	1354	100.0	1345	100.0
12	SPED	19	2.0	22	2.5	30	3.0	32	3.2	13	1.1
	HILT	0	.0	1	.1	0	.0	1	.1	2	.2
	Remedial	0	.0	0	.0	1	.1	0	.0	0	.0
	Extra Support	51	5.5	28	3.1	82	8.3	71	7.1	74	6.5
	Grade-Level	517	55.8	508	57.0	508	51.3	498	49.8	606	53.5
	Accelerated	340	36.7	333	37.3	369	37.3	397	39.7	437	38.6
	Total	927	100.0	892	100.0	990	100.0	999	100.0	1132	100.0

Secondary Mathematics Courses Types

Course Type	Middle School	High School
SPED	Math Math 6 Math 7 Math 8	Math Math 11 Math 12 Algebra I Part I Selected Topics in Geometry
HILT	HILT Math Level 1 HILT Math Level 2	Accelerated Literacy Math HILT Math Level 1 HILT Math Level 2 General Math I
Remedial	Math 6, taken in a higher grade Math 7, taken in a higher grade	HS General Math Math 8, taken in high school
Extra Support	Math Skills/Math Power Algebra Prep	Algebra Prep Algebra I Part I Algebra I Part II Algebra, Functions & Data Analysis RISE Algebra Algebra II Principles Geometry Principles RISE Geometry
Grade-Level	Math 6 Math 7 Math 8	Algebra I Algebra II Geometry Math Analysis - Trigonometry Probability and Statistics Precalculus
Accelerated	Math 6 Intensified Math 7 Intensified Math 7, taken in 6th grade Math 8, taken in 6th or 7th grade Algebra I Algebra I Intensified Geometry Geometry Intensified	Geometry , taken in 9th grade Geometry Intensified Algebra II , taken in 10th grade Algebra II Intensified Precalculus Intensified IB Math Studies IB Math Methods Precalculus IB Math Methods Calculus AP Statistics AP Calculus AB AP Calculus BC Multivariable Calculus

Middle School Mathematics Enrollment by Course Type and Race, 2006-07 through 2010-11

Course Type	Race	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Asian	25	6.6	16	4.7	18	5.5	14	5.1	14	5.5
	Black	94	24.7	91	27.0	86	26.2	82	29.6	59	23.3
	Hispanic	198	52.0	165	49.0	160	48.8	133	48.0	120	47.4
	White	63	16.5	63	18.7	63	19.2	47	17.0	44	17.4
	Other	1	.3	2	.6	1	.3	1	.4	16	6.3
	Total	381	100.0	337	100.0	328	100.0	277	100.0	253	100.0
HILT	Asian	18	14.1	19	17.1	13	13.5	19	14.8	10	9.5
	Black	13	10.2	11	9.9	6	6.3	7	5.5	9	8.6
	Hispanic	88	68.8	68	61.3	69	71.9	79	61.7	67	63.8
	White	9	7.0	13	11.7	8	8.3	23	18.0	18	17.1
	Other	0	.0	0	.0	0	.0	0	.0	1	1.0
	Total	128	100.0	111	100.0	96	100.0	128	100.0	105	100.0
Remedial	Asian	0	0	0	0	1	25.0	0	.0	0	.0
	Black	0	.0	1	100.0	0	.0	0	.0	0	.0
	Hispanic	0	.0	0	.0	3	75.0	1	100.0	1	100.0
	White	0	.0	0	.0	0	.0	0	.0	0	.0
	Total	0	.0	1	100.0	4	100.0	1	100.0	1	100.0
Extra Support	Asian	3	11.5	10	17.5	12	11.3	17	22.7	19	9.2
	Black	8	30.8	11	19.3	23	21.7	9	12.0	60	29.1
	Hispanic	15	57.7	27	47.4	56	52.8	30	40.0	107	51.9
	White	0	.0	9	15.8	12	11.3	19	25.3	17	8.3
	Other	0	.0	0	.0	3	2.8	0	.0	3	1.5
	Total	26	100.0	57	100.0	106	100.0	75	100.0	206	100.0
Grade-Level	Asian	153	11.1	211	12.7	206	11.3	216	10.7	190	9.0
	Black	328	23.7	327	19.6	323	17.8	331	16.4	329	15.5
	Hispanic	488	35.3	565	33.9	598	32.9	650	32.3	731	34.4
	White	405	29.3	551	33.1	674	37.1	803	39.9	769	36.2
	Other	9	.7	12	.7	17	.9	15	.7	103	4.9
	Total	1383	100.0	1666	100.0	1818	100.0	2015	100.0	2122	100.0
Accelerated	Asian	208	11.9	193	11.4	181	11.6	183	11.9	149	9.1
	Black	122	7.0	123	7.2	117	7.5	108	7.0	80	4.9
	Hispanic	215	12.3	216	12.7	178	11.4	153	9.9	222	13.6
	White	1192	68.1	1160	68.3	1077	68.9	1086	70.5	1070	65.7
	Other	13	.7	6	.4	10	.6	11	.7	108	6.6
	Total	1750	100.0	1698	100.0	1563	100.0	1541	100.0	1629	100.0
Total Middle School	Asian	-	10.8	-	11.3	-	11.1	-	10.8	-	8.8
	Black	-	15.6	-	14.6	-	14	-	13.4	-	11.5
	Hispanic	-	26.9	-	26.3	-	25.8	-	24.8	-	27.5
	White	-	46	-	47.1	-	48.4	-	50.3	-	46.5
	Other	-	0.7	-	0.6	-	0.7	-	0.7	-	5.5

High School Mathematics Enrollment by Course Type and Race, 2006-07 through 2010-11

Course Type	Race	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Asian	9	6.5	9	7.7	4	3.0	6	3.8	6	4.7
	Black	51	37.0	46	39.3	38	28.6	44	28.2	30	23.4
	Hispanic	42	30.4	43	36.8	70	52.6	81	51.9	67	52.3
	White	36	26.1	18	15.4	21	15.8	24	15.4	18	14.1
	Other	0	.0	1	.9	0	.0	1	.6	7	5.5
	Total	138	100.0	117	100.0	133	100.0	156	100.0	128	100.0
HILT	Asian	8	5.8	16	12.1	12	11.1	16	17.0	13	16.0
	Black	9	6.5	4	3.0	12	11.1	10	10.6	7	8.6
	Hispanic	117	84.8	107	81.1	81	75.0	64	68.1	59	72.8
	White	4	2.9	5	3.8	3	2.8	4	4.3	2	2.5
	Other	0	.0	0	.0	0	.0	0	.0	0	.0
	Total	138	100.0	132	100.0	108	100.0	94	100.0	81	100.0
Remedial	Asian	4	9.1	4	8.7	6	15.0	4	10.5	1	3.3
	Black	6	13.6	8	17.4	5	12.5	5	13.2	2	6.7
	Hispanic	30	68.2	31	67.4	28	70.0	27	71.1	24	80.0
	White	4	9.1	3	6.5	1	2.5	2	5.3	3	10.0
	Other	0	.0	0	.0	0	.0	0	.0	0	.0
	Total	44	100.0	46	100.0	40	100.0	38	100.0	30	100.0
Extra Support	Asian	65	10.4	53	9.6	51	8.0	52	9.3	50	9.5
	Black	156	25.0	137	24.7	166	25.9	156	28.0	134	25.5
	Hispanic	309	49.6	285	51.4	353	55.1	279	50.0	280	53.3
	White	88	14.1	78	14.1	71	11.1	71	12.7	46	8.8
	Other	5	.8	1	.2	0	.0	0	.0	15	2.9
	Total	623	100.0	554	100.0	641	100.0	558	100.0	525	100.0
Grade-Level	Asian	260	12.5	243	11.1	251	11.9	274	11.7	284	11.1
	Black	379	18.3	409	18.7	395	18.7	445	19.1	447	17.5
	Hispanic	652	31.4	752	34.4	716	33.9	729	31.2	855	33.4
	White	779	37.5	769	35.2	731	34.6	864	37.0	888	34.7
	Other	6	.3	10	.5	20	.9	21	.9	87	3.4
	Total	2076	100.0	2183	100.0	2113	100.0	2333	100.0	2561	100.0
Accelerated	Asian	196	11.2	233	12.9	267	13.6	265	13.9	270	13.5
	Black	106	6.1	147	8.2	146	7.4	143	7.5	128	6.4
	Hispanic	227	13.0	198	11.0	255	13.0	254	13.3	319	15.9
	White	1202	68.9	1200	66.7	1282	65.2	1230	64.4	1174	58.6
	Other	13	.7	22	1.2	16	.8	17	.9	113	5.6
	Total	1744	100.0	1800	100.0	1966	100.0	1909	100.0	2004	100.0
Total High School	Asian	-	10.6	-	10.8	-	11.1	-	11.8	-	11
	Black	-	15.2	-	15.8	-	15.3	-	15.7	-	14.1
	Hispanic	-	30.5	-	29.6	-	30.5	-	29.5	-	31
	White	-	43.1	-	43.2	-	42.4	-	42.2	-	40
	Other	-	0.5	-	0.6	-	0.6	-	0.8	-	4

Middle School Mathematics Enrollment by Course Type and Gender, 2006-07 through 2010-11

Course Type	Gender	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Female	141	37.0	129	38.3	115	35.1	88	31.8	82	32.4
	Male	240	63.0	208	61.7	213	64.9	189	68.2	171	67.6
	Total	381	100.0	337	100.0	328	100.0	277	100.0	253	100.0
HILT	Female	63	48.8	63	56.8	41	42.7	52	40.6	33	31.4
	Male	66	51.2	48	43.2	55	57.3	76	59.4	72	68.6
	Total	129	100.0	111	100.0	96	100.0	128	100.0	105	100.0
Remedial	Female	0	0	0	0	3	75.0	0	0	1	100.0
	Male	0	.0	1	100.0	1	25.0	1	100.0	0	.0
	Total	0	.0	1	100.0	4	100.0	1	100.0	1	100.0
Extra Support	Female	17	65.4	30	52.6	53	50.0	38	50.7	109	52.9
	Male	9	34.6	27	47.4	53	50.0	37	49.3	97	47.1
	Total	26	100.0	57	100.0	106	100.0	75	100.0	206	100.0
Grade-Level	Female	722	52.2	870	52.2	960	52.8	1026	50.9	1068	50.3
	Male	662	47.8	796	47.8	858	47.2	989	49.1	1054	49.7
	Total	1384	100.0	1666	100.0	1818	100.0	2015	100.0	2122	100.0
Accelerated	Female	890	50.8	848	49.9	790	50.5	733	47.6	784	48.1
	Male	861	49.2	850	50.1	773	49.5	808	52.4	845	51.9
	Total	1751	100.0	1698	100.0	1563	100.0	1541	100.0	1629	100.0
Total Middle	Female	-	-	-	-	-	-	-	-	-	-
	Male	-	-	-	-	-	-	-	-	-	-

* Males and females are typically always around
50% to 50%; therefore, demographic data were not collected for these groups.

High School Mathematics Enrollment by Course Type and Gender, 2006-07 through 2010-11

Course Type	Gender	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Female	50	36.2	39	33.3	41	30.8	61	39.1	51	39.8
	Male	88	63.8	78	66.7	92	69.2	95	60.9	77	60.2
	Total	138	100.0	117	100.0	133	100.0	156	100.0	128	100.0
HILT	Female	61	40.4	61	46.2	47	43.5	41	43.6	43	53.1
	Male	90	59.6	71	53.8	61	56.5	53	56.4	38	46.9
	Total	151	100.0	132	100.0	108	100.0	94	100.0	81	100.0
Remedial	Female	18	40.9	20	43.5	18	45.0	10	26.3	9	30.0
	Male	26	59.1	26	56.5	22	55.0	28	73.7	21	70.0
	Total	44	100.0	46	100.0	40	100.0	38	100.0	30	100.0
Extra Support	Female	266	42.3	232	41.9	272	42.4	237	42.5	226	43.0
	Male	363	57.7	322	58.1	369	57.6	321	57.5	299	57.0
	Total	629	100.0	554	100.0	641	100.0	558	100.0	525	100.0
Grade-Level	Female	1036	49.9	1101	50.4	1060	50.2	1171	50.2	1261	49.2
	Male	1040	50.1	1082	49.6	1053	49.8	1162	49.8	1300	50.8
	Total	2076	100.0	2183	100.0	2113	100.0	2333	100.0	2561	100.0
Accelerated	Female	913	52.1	922	51.2	1003	51.0	1006	52.7	1031	51.4
	Male	838	47.9	878	48.8	963	49.0	903	47.3	973	48.6
	Total	1751	100.0	1800	100.0	1966	100.0	1909	100.0	2004	100.0
Total High School*	Female	-	-	-	-	-	-	-	-	-	-
	Male	-	-	-	-	-	-	-	-	-	-

* Males and females are typically always around
50% to 50%; therefore, demographic data were not collected for these groups.

Middle School Mathematics Enrollment by Course Type and LEP Status, 2006-07 through 2010-11

Course Type	LEP Status	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Non-LEP	189	49.6	172	51.0	166	50.6	140	50.5	148	58.5
	LEP	192	50.4	165	49.0	162	49.4	137	49.5	105	41.5
	Total	381	100.0	337	100.0	328	100.0	277	100.0	253	100.0
HILT	Non-LEP	5	3.9	0	0	0	0	2	1.6	0	0
	LEP	123	96.1	111	100.0	96	100.0	126	98.4	105	100.0
	Total	128	100.0	0	.0	0	.0	128	100.0	0	.0
Remedial	Non-LEP	0	.0	1	100.0	0	0	0	0	0	0
	LEP	0	.0	0	.0	4	100.0	1	100.0	1	100.0
	Total	0	.0	1	100.0	4	100.0	1	100.0	1	100.0
Extra Support	Non-LEP	9	34.6	24	42.1	37	34.9	22	29.3	89	43.2
	LEP	17	65.4	33	57.9	69	65.1	53	70.7	117	56.8
	Total	26	100.0	57	100.0	106	100.0	75	100.0	206	100.0
Grade-Level	Non-LEP	813	58.8	1030	61.8	1176	64.7	1303	64.7	1514	71.3
	LEP	570	41.2	636	38.2	642	35.3	712	35.3	608	28.7
	Total	1383	100.0	1666	100.0	1818	100.0	2015	100.0	2122	100.0
Accelerated	Non-LEP	1540	88.0	1489	87.7	1381	88.4	1386	89.9	1558	95.6
	LEP	210	12.0	209	12.3	182	11.6	155	10.1	71	4.4
	Total	1750	100.0	1698	100.0	1563	100.0	1541	100.0	1629	100.0
Total Middle School	Non-LEP	-	71.0	-	71.9	-	72.2	-	72.4	-	72.3
	LEP	-	29.0	-	28.1	-	27.8	-	27.6	-	27.7

High School Mathematics Enrollment by Course Type and LEP Status, 2006-07 through 2010-11

Course Type	LEP Status	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Non-LEP	116	84.1	94	80.3	98	73.7	114	73.1	116	90.6
	LEP	22	15.9	23	19.7	35	26.3	42	26.9	12	9.4
	Total	138	100.0	117	100.0	133	100.0	156	100.0	128	100.0
HILT	Non-LEP	9	6.5	0	0	0	0	2	2.1	4	4.9
	LEP	129	93.5	132	100.0	108	100.0	92	97.9	77	95.1
	Total	138	100.0	132	100.0	108	100.0	94	100.0	81	100.0
Remedial	Non-LEP	12	27.3	11	23.9	6	15.0	2	5.3	9	30.0
	LEP	32	72.7	35	76.1	34	85.0	36	94.7	21	70.0
	Total	44	100.0	46	100.0	40	100.0	38	100.0	30	100.0
Extra Support	Non-LEP	321	51.5	263	47.5	338	52.7	279	50.0	293	55.8
	LEP	302	48.5	291	52.5	303	47.3	279	50.0	232	44.2
	Total	623	100.0	554	100.0	641	100.0	558	100.0	525	100.0
Grade-Level	Non-LEP	1571	75.7	1627	74.5	1574	74.5	1778	76.2	2170	84.7
	LEP	505	24.3	556	25.5	539	25.5	555	23.8	391	15.3
	Total	2076	100.0	2183	100.0	2113	100.0	2333	100.0	2561	100.0
Accelerated	Non-LEP	1606	92.1	1642	91.2	1786	90.8	1754	91.9	1934	96.5
	LEP	138	7.9	158	8.8	180	9.2	155	8.1	70	3.5
	Total	1744	100.0	1800	100.0	1966	100.0	1909	100.0	2004	100.0
Total High School	Non-LEP	-	75.1	-	73.5	-	74.4	-	73.6	-	73.7
	LEP	-	24.9	-	26.5	-	25.6	-	26.4	-	26.3

Middle School Mathematics Enrollment by Course Type and Economic Status, 2006-07 through 2010-11

Course Type	Economic Status	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Non-Disadvantaged	130	34.1	135	40.1	123	37.5	101	36.5	101	39.9
	Disadvantaged	251	65.9	202	59.9	205	62.5	176	63.5	152	60.1
	Total	381	100.0	337	100.0	328	100.0	277	100.0	253	100.0
HILT	Non-Disadvantaged	17	13.3	16	14.4	25	26.0	10	7.8	6	5.7
	Disadvantaged	111	86.7	95	85.6	71	74.0	118	92.2	99	94.3
	Total	128	100.0	111	100.0	96	100.0	128	100.0	105	100.0
Remedial	Non-Disadvantaged	0	.0	1	100.0	0	0	0	0	0	0
	Disadvantaged	0	.0	0	.0	4	100.0	1	100.0	1	100.0
	Total	0	.0	1	100.0	4	100.0	1	100.0	1	100.0
Extra Support	Non-Disadvantaged	3	11.5	19	33.3	40	37.7	25	33.3	64	31.1
	Disadvantaged	23	88.5	38	66.7	66	62.3	50	66.7	142	68.9
	Total	26	100.0	57	100.0	106	100.0	75	100.0	206	100.0
Grade-Level	Non-Disadvantaged	726	52.5	994	59.7	1084	59.6	1212	60.1	1259	59.3
	Disadvantaged	657	47.5	672	40.3	734	40.4	803	39.9	863	40.7
	Total	1383	100.0	1666	100.0	1818	100.0	2015	100.0	2122	100.0
Accelerated	Non-Disadvantaged	1507	86.1	1480	87.2	1342	85.9	1339	86.9	1426	87.5
	Disadvantaged	243	13.9	218	12.8	221	14.1	202	13.1	203	12.5
	Total	1750	100.0	1698	100.0	1563	100.0	1541	100.0	1629	100.0
Total Middle School	Non-Disadvantaged	-	65.0	-	68.3	-	66.9	-	67.5	-	67.6
	Disadvantaged	-	35.0	-	31.7	-	33.1	-	32.5	-	32.4

High School Mathematics Enrollment by Course Type and Economic Status, 2006-07 through 2010-11

Course Type	Economic Status	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Non-Disadvantaged	73	52.9	59	50.4	54	40.6	59	37.8	58	45.3
	Disadvantaged	65	47.1	58	49.6	79	59.4	97	62.2	70	54.7
	Total	138	100.0	117	100.0	133	100.0	156	100.0	128	100.0
HILT	Non-Disadvantaged	28	20.3	28	21.2	17	15.7	8	8.5	30	37.0
	Disadvantaged	110	79.7	104	78.8	91	84.3	86	91.5	51	63.0
	Total	138	100.0	132	100.0	108	100.0	94	100.0	81	100.0
Remedial	Non-Disadvantaged	13	29.5	18	39.1	7	17.5	6	15.8	7	23.3
	Disadvantaged	31	70.5	28	60.9	33	82.5	32	84.2	23	76.7
	Total	44	100.0	46	100.0	40	100.0	38	100.0	30	100.0
Extra Support	Non-Disadvantaged	254	40.8	244	44.0	275	42.9	226	40.5	215	41.0
	Disadvantaged	369	59.2	310	56.0	366	57.1	332	59.5	310	59.0
	Total	623	100.0	554	100.0	641	100.0	558	100.0	525	100.0
Grade-Level	Non-Disadvantaged	1308	63.0	1432	65.6	1307	61.9	1491	63.9	1659	64.8
	Disadvantaged	768	37.0	751	34.4	806	38.1	842	36.1	899	35.1
	Total	2076	100.0	2183	100.0	2113	100.0	2333	100.0	2561	100.0
Accelerated	Non-Disadvantaged	1502	86.1	1569	87.2	1670	84.9	1630	85.4	1687	84.2
	Disadvantaged	242	13.9	231	12.8	296	15.1	279	14.6	316	15.8
	Total	1744	100.0	1800	100.0	1966	100.0	1909	100.0	2004	100.0
Total High School	Non-Disadvantaged	-	67.2	-	69.6	-	67.1	-	66.6	-	67.6
	Disadvantaged	-	32.8	-	30.4	-	32.9	-	33.4	-	32.4

Middle School Mathematics Enrollment by Course Type and Disability Status, 2006-07 through 2010-11

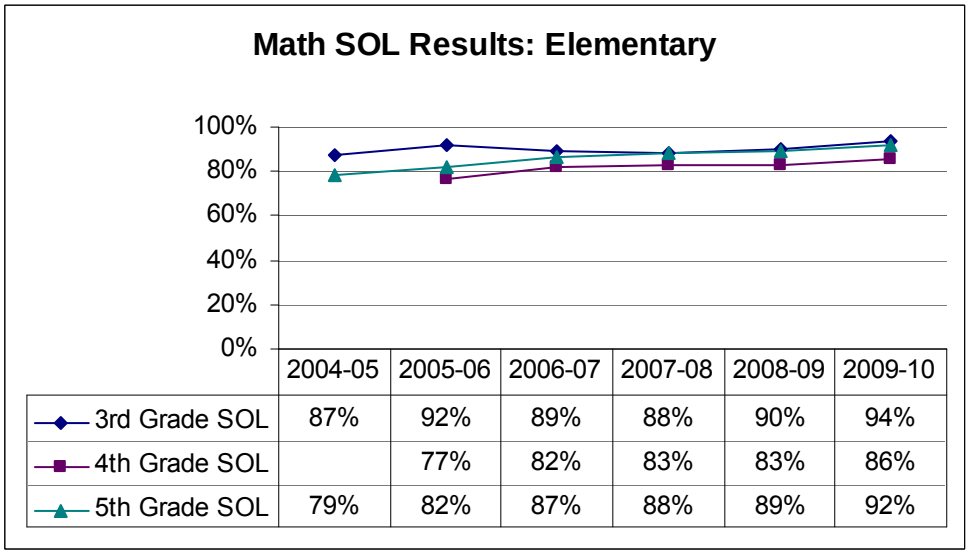
Course Type	Disability Status	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Non-Disabled	3	.8	5	1.5	13	4.0	3	1.1	6	2.4
	Disabled	378	99.2	332	98.5	315	96.0	274	98.9	247	97.6
	Total	381	100.0	337	100.0	328	100.0	277	100.0	253	100.0
HILT	Non-Disabled	127	99.2	104	93.7	87	90.6	121	94.5	105	100.0
	Disabled	1	.8	7	6.3	9	9.4	7	5.5	0	.0
	Total	128	100.0	111	100.0	96	100.0	128	100.0	105	100.0
Remedial	Non-Disabled	0	.0	1	100.0	4	100.0	1	100.0	1	100.0
	Disabled	0	.0	0	.0	0	.0	0	.0	0	.0
	Total	0	.0	1	100.0	4	100.0	1	100.0	1	100.0
Extra Support	Non-Disabled	12	46.2	49	86.0	94	88.7	62	82.7	168	81.6
	Disabled	14	53.8	8	14.0	12	11.3	13	17.3	38	18.4
	Total	26	100.0	57	100.0	106	100.0	75	100.0	206	100.0
Grade-Level	Non-Disabled	1180	85.3	1446	86.8	1602	88.1	1732	86.0	1842	86.8
	Disabled	203	14.7	220	13.2	216	11.9	283	14.0	280	13.2
	Total	1383	100.0	1666	100.0	1818	100.0	2015	100.0	2122	100.0
Accelerated	Non-Disabled	1681	96.1	1631	96.1	1513	96.8	1484	96.3	1571	96.4
	Disabled	69	3.9	67	3.9	50	3.2	57	3.7	58	3.6
	Total	1750	100.0	1698	100.0	1563	100.0	1541	100.0	1629	100.0
Total Middle School	Non-Disabled	-	81.1	-	82.5	-	83.3	-	83.2	-	83.4
	Disabled	-	18.9	-	17.5	-	16.7	-	16.8	-	16.6

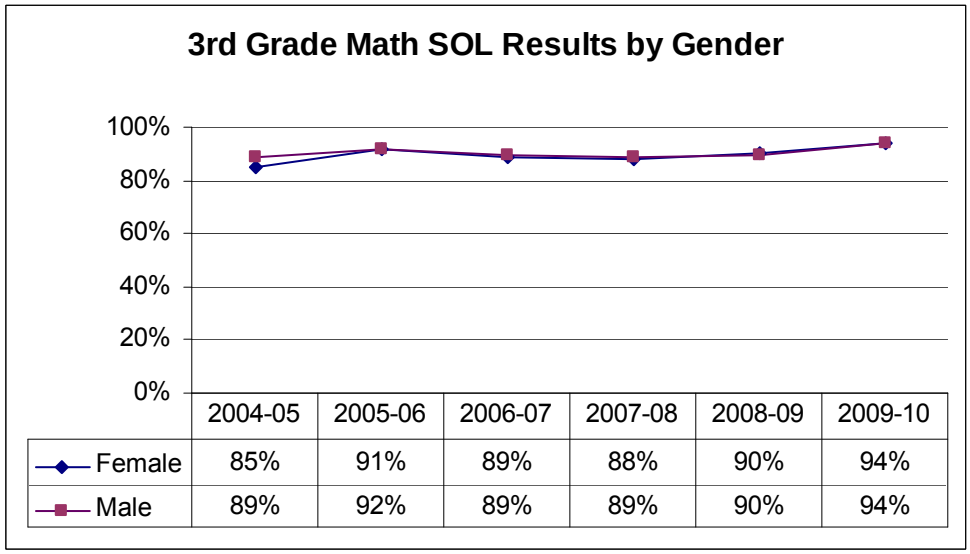
High School Mathematics Enrollment by Course Type and Disability Status, 2006-07 through 2010-11

Course Type	Disability Status	2006-07		2007-08		2008-09		2009-10		2010-11	
		N	Percent	N	Percent	N	Percent	N	Percent	N	Percent
SPED	Non-Disabled	1	.7	0	0	1	.8	0	0	3	2.3
	Disabled	137	99.3	117	100.0	132	99.2	156	100.0	125	97.7
	Total	138	100.0	117	100.0	133	100.0	156	100.0	128	100.0
HILT	Non-Disabled	138	100.0	130	98.5	104	96.3	91	96.8	76	93.8
	Disabled	0	0	2	1.5	4	3.7	3	3.2	5	6.2
	Total	138	100.0	132	100.0	108	100.0	94	100.0	81	100.0
Remedial	Non-Disabled	36	81.8	32	69.6	33	82.5	32	84.2	21	70.0
	Disabled	8	18.2	14	30.4	7	17.5	6	15.8	9	30.0
	Total	44	100.0	46	100.0	40	100.0	38	100.0	30	100.0
Extra Support	Non-Disabled	446	71.6	380	68.6	435	67.9	375	67.2	370	70.5
	Disabled	177	28.4	174	31.4	206	32.1	183	32.8	155	29.5
	Total	623	100.0	554	100.0	641	100.0	558	100.0	525	100.0
Grade-Level	Non-Disabled	1889	91.0	1974	90.4	1908	90.3	2068	88.6	2273	88.8
	Disabled	187	9.0	209	9.6	205	9.7	265	11.4	288	11.2
	Total	2076	100.0	2183	100.0	2113	100.0	2333	100.0	2561	100.0
Accelerated	Non-Disabled	1699	97.4	1747	97.1	1899	96.6	1827	95.7	1952	97.4
	Disabled	45	2.6	53	2.9	67	3.4	82	4.3	52	2.6
	Total	1744	100.0	1800	100.0	1966	100.0	1909	100.0	2004	100.0
Total High School	Non-Disabled	-	85.3	-	85.2	-	84.7	-	83.8	-	84
	Disabled	-	14.7	-	14.8	-	15.3	-	16.2	-	16

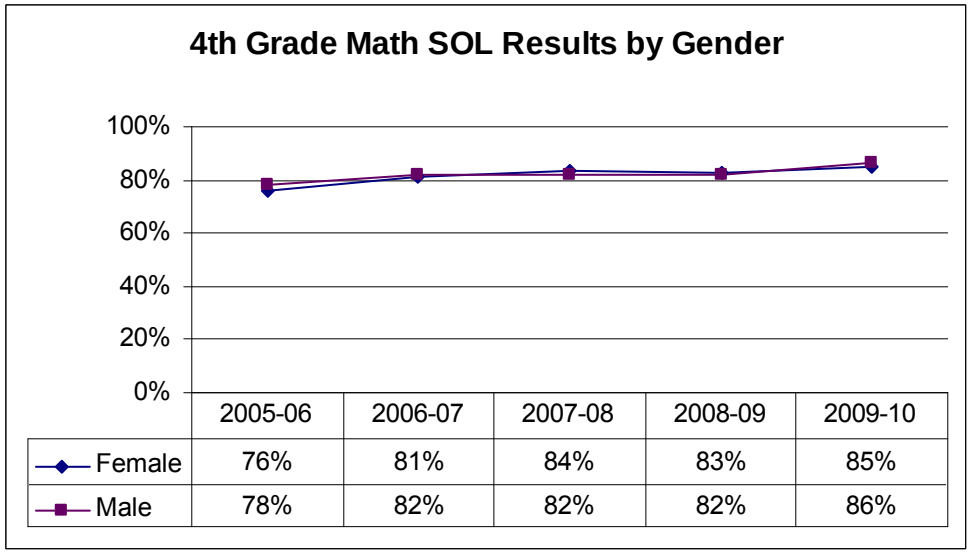
Math SOL Results: Elementary

School Year	3rd Grade SOL		4th Grade SOL		5th Grade SOL	
	No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
2004-05	1358	87%	-	-	1428	79%
2005-06	1333	92%	1309	77%	1245	82%
2006-07	1326	89%	1323	82%	1280	87%
2007-08	1426	88%	1334	83%	1312	88%
2008-09	1440	90%	1419	83%	1324	89%
2009-10	1619	94%	1446	86%	1399	92%

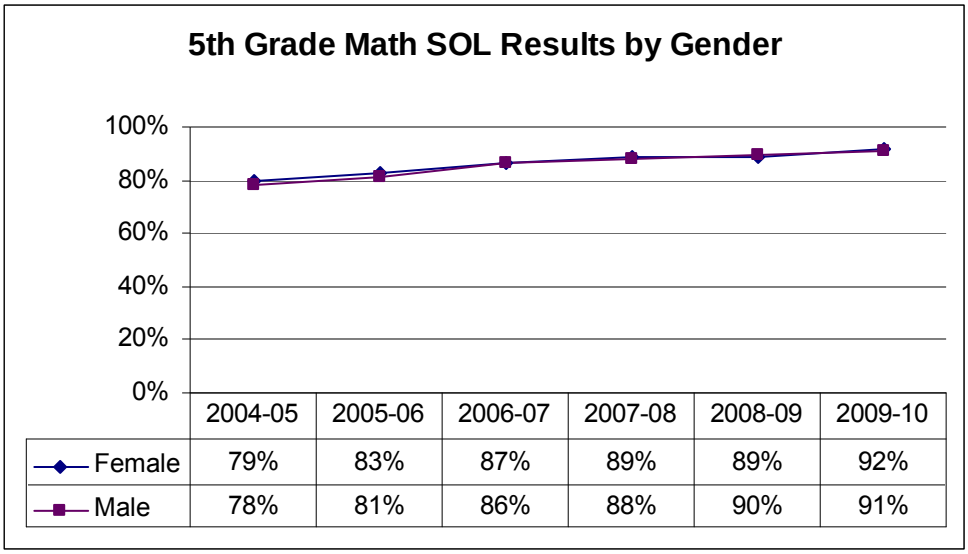




	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Female	85%	91%	89%	88%	90%	94%
Male	89%	92%	89%	89%	90%	94%



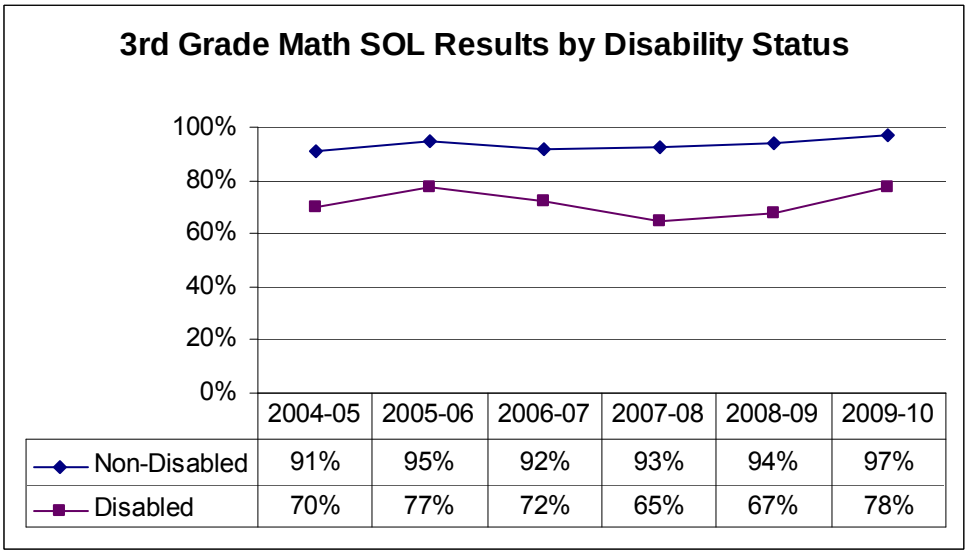
	2005-06	2006-07	2007-08	2008-09	2009-10
Female	76%	81%	84%	83%	85%
Male	78%	82%	82%	82%	86%



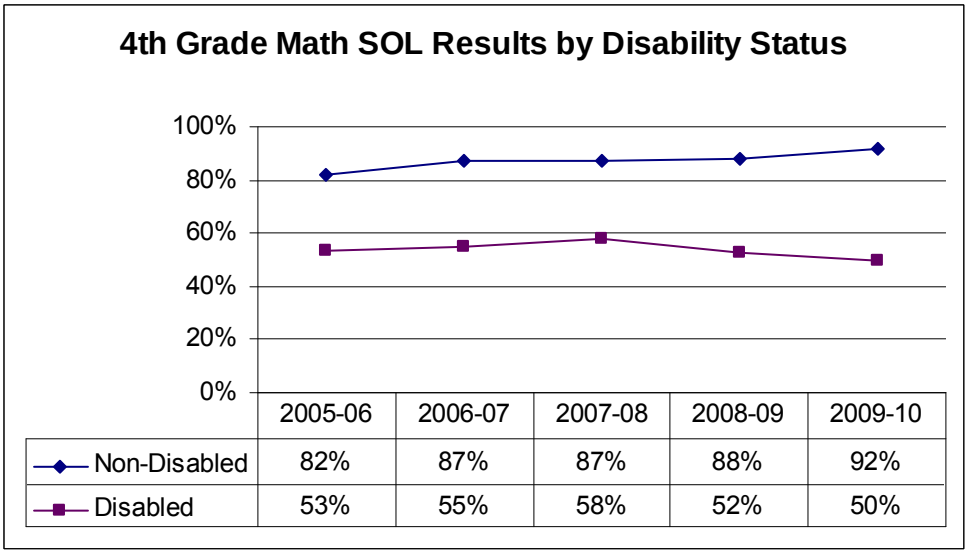
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Female	79%	83%	87%	89%	89%	92%
Male	78%	81%	86%	88%	90%	91%

Elementary Math SOL Results by Gender

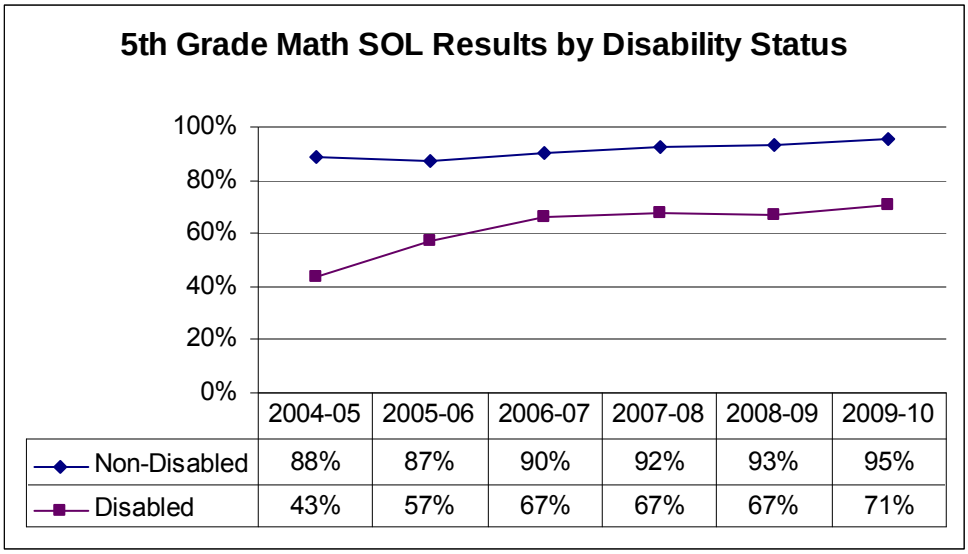
Gender	School Year	3rd Grade SOL		4th Grade SOL		5th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Female	2004-05	665	85%	-	-	693	79%
	2005-06	652	91%	628	76%	657	83%
	2006-07	630	89%	656	81%	615	87%
	2007-08	714	88%	634	84%	642	89%
	2008-09	723	90%	707	83%	629	89%
	2009-10	777	94%	735	85%	695	92%
Male	2004-05	693	89%	-	-	735	78%
	2005-06	681	92%	681	78%	588	81%
	2006-07	696	89%	667	82%	665	86%
	2007-08	712	89%	700	82%	670	88%
	2008-09	717	90%	712	82%	695	90%
	2009-10	842	94%	711	86%	704	91%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	91%	95%	92%	93%	94%	97%
Disabled	70%	77%	72%	65%	67%	78%



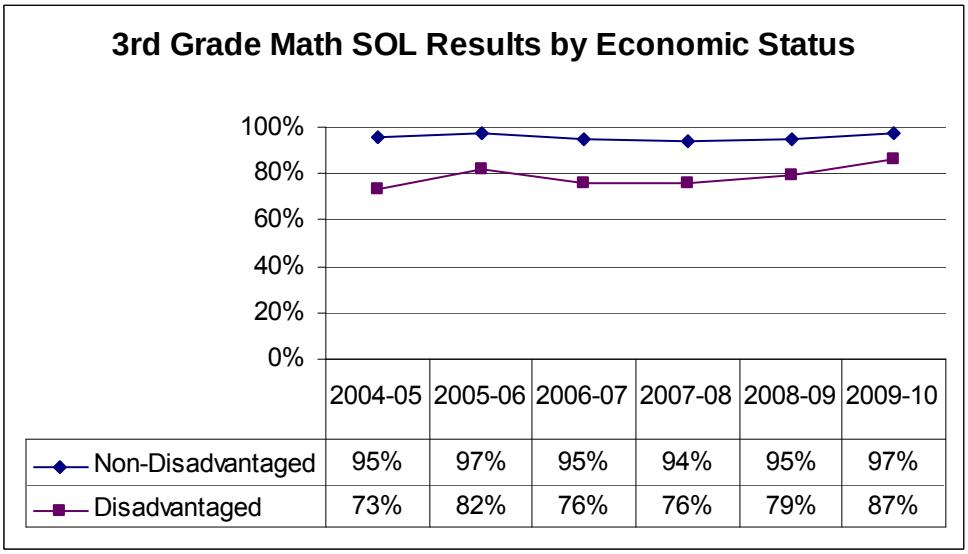
	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	82%	87%	87%	88%	92%
Disabled	53%	55%	58%	52%	50%



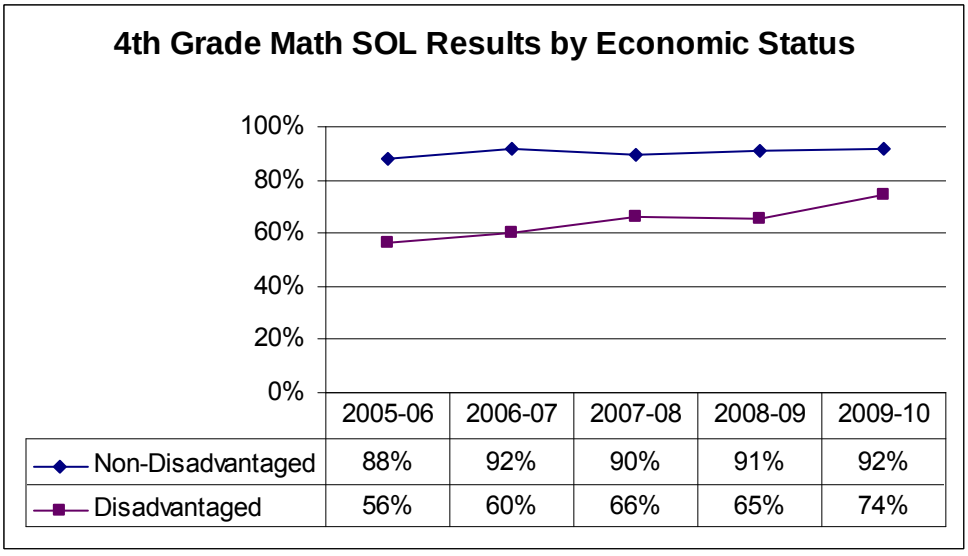
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	88%	87%	90%	92%	93%	95%
Disabled	43%	57%	67%	67%	67%	71%

Elementary Math SOL Results by Disability Status

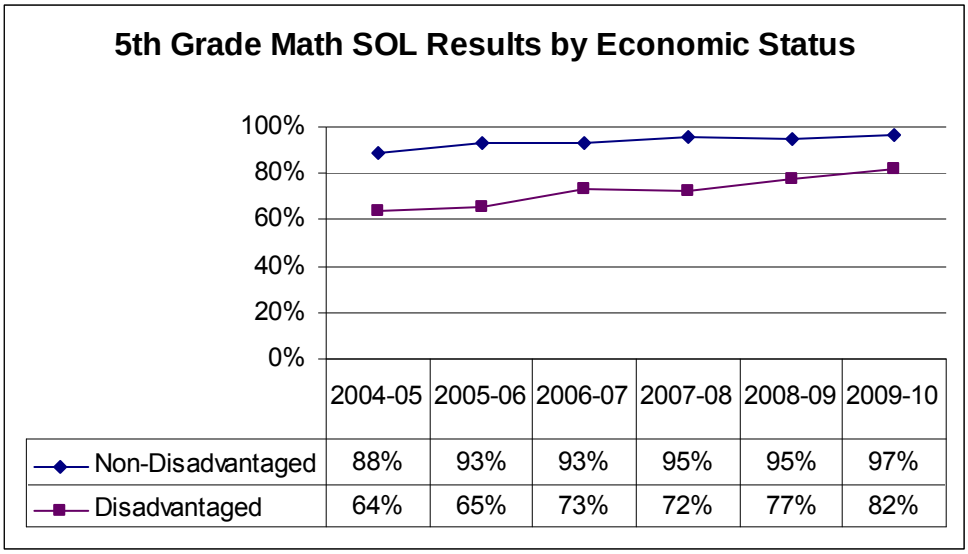
Disability Status	School Year	3rd Grade SOL		4th Grade SOL		5th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-Disabled	2004-05	1106	91%	-	-	1122	88%
	2005-06	1102	95%	1081	82%	1027	87%
	2006-07	1118	92%	1106	87%	1074	90%
	2007-08	1207	93%	1115	87%	1103	92%
	2008-09	1228	94%	1209	88%	1125	93%
	2009-10	1381	97%	1232	92%	1194	95%
Disabled	2004-05	252	70%	-	-	306	43%
	2005-06	231	77%	228	53%	218	57%
	2006-07	208	72%	217	55%	206	67%
	2007-08	219	65%	219	58%	209	67%
	2008-09	212	67%	210	52%	199	67%
	2009-10	238	78%	214	50%	205	71%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	95%	97%	95%	94%	95%	97%
Disadvantaged	73%	82%	76%	76%	79%	87%



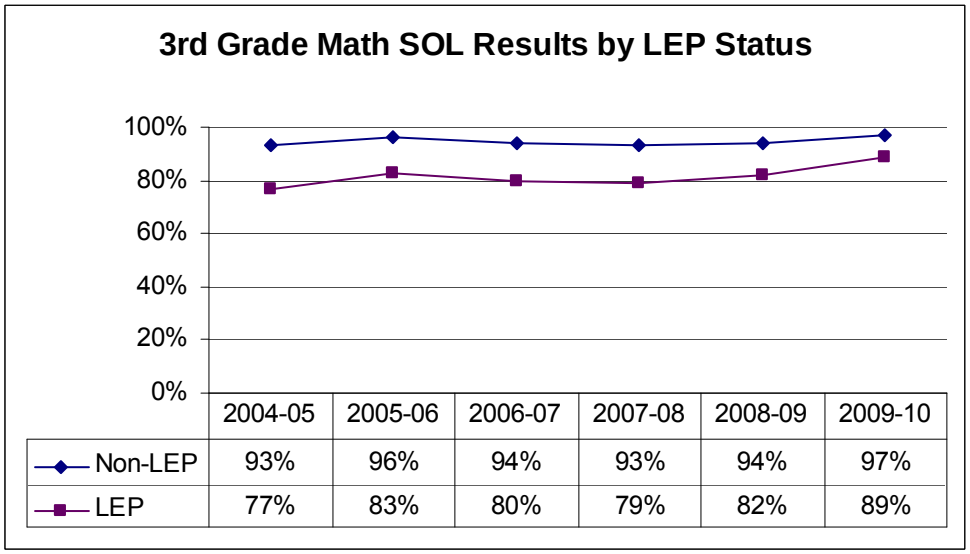
	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	88%	92%	90%	91%	92%
Disadvantaged	56%	60%	66%	65%	74%



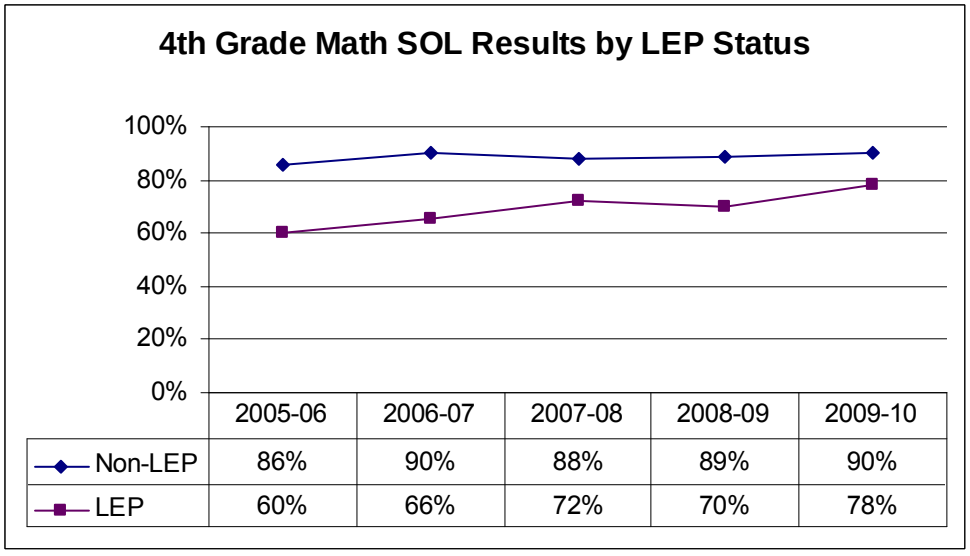
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	88%	93%	93%	95%	95%	97%
Disadvantaged	64%	65%	73%	72%	77%	82%

Elementary Math SOL Results by Economic Status

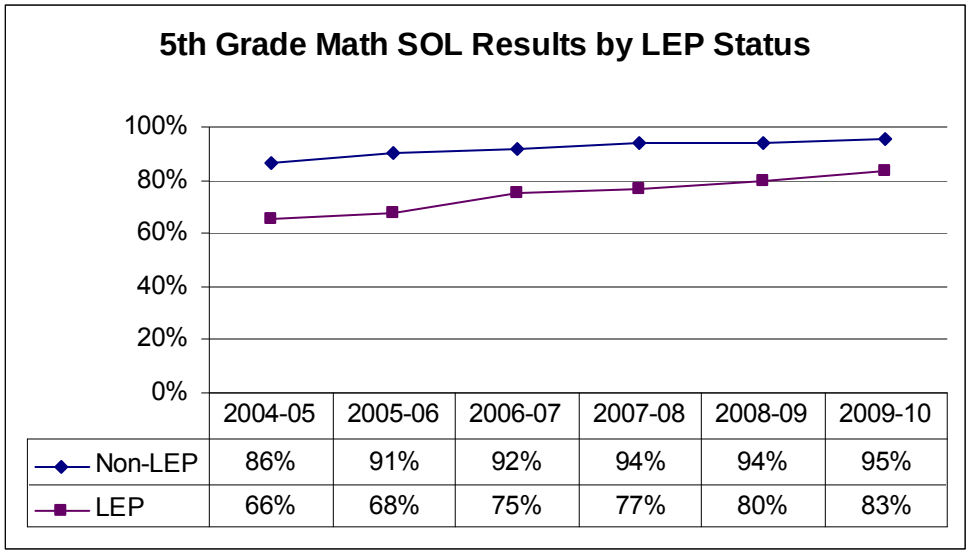
Economic Status	School Year	3rd Grade SOL		4th Grade SOL		5th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-Disadvantaged	2004-05	854	95%	-	-	874	88%
	2005-06	854	97%	845	88%	750	93%
	2006-07	899	95%	893	92%	876	93%
	2007-08	979	94%	938	90%	921	95%
	2008-09	960	95%	964	91%	898	95%
	2009-10	1107	97%	959	92%	925	97%
Disadvantaged	2004-05	504	73%	-	-	554	64%
	2005-06	479	82%	464	56%	495	65%
	2006-07	427	76%	430	60%	404	73%
	2007-08	447	76%	396	66%	391	72%
	2008-09	480	79%	455	65%	426	77%
	2009-10	512	87%	487	74%	474	82%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	93%	96%	94%	93%	94%	97%
LEP	77%	83%	80%	79%	82%	89%



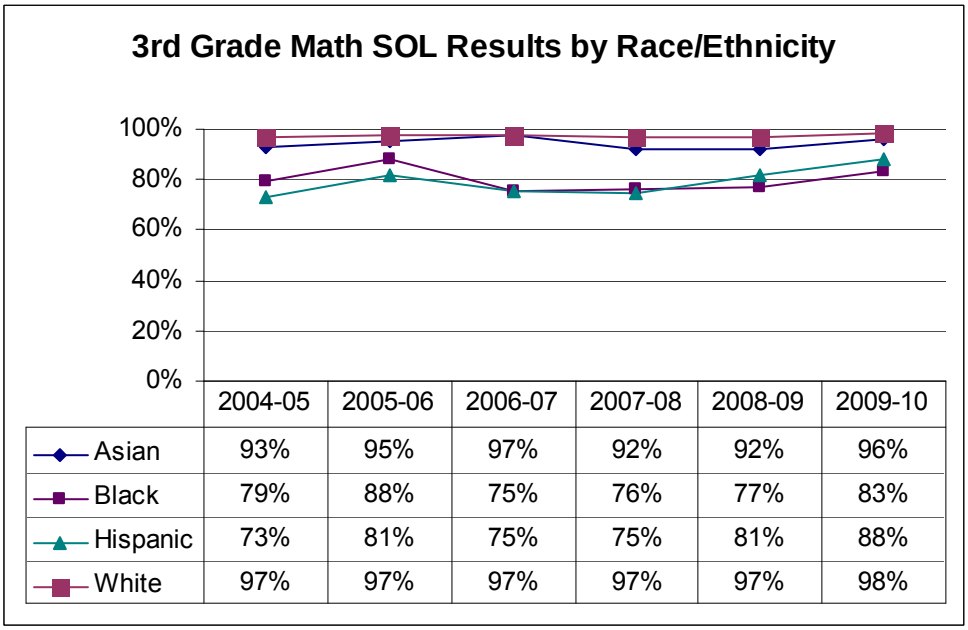
	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	86%	90%	88%	89%	90%
LEP	60%	66%	72%	70%	78%



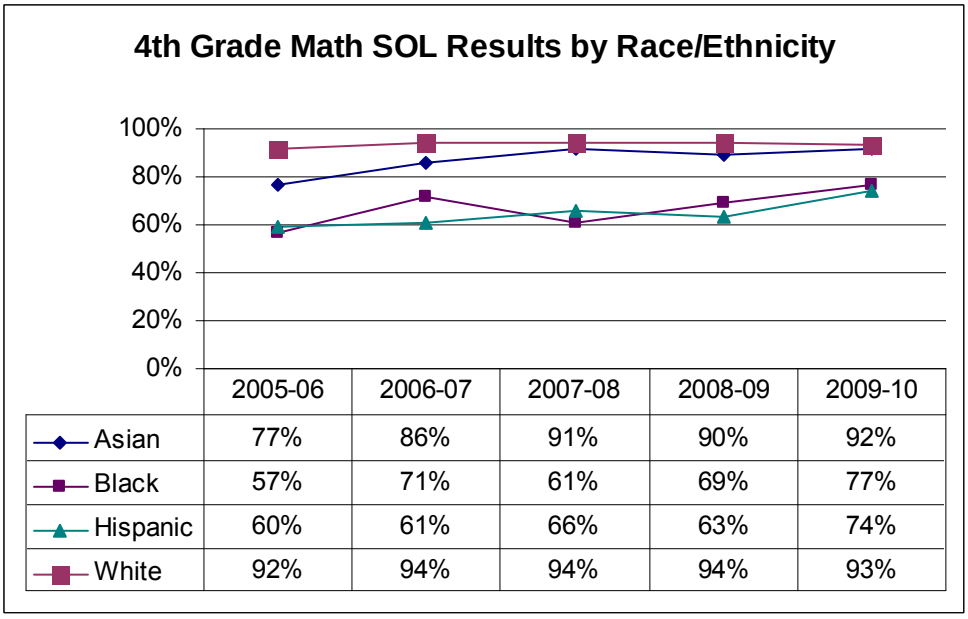
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	86%	91%	92%	94%	94%	95%
LEP	66%	68%	75%	77%	80%	83%

Elementary Math SOL Results by Limited English Proficiency Status

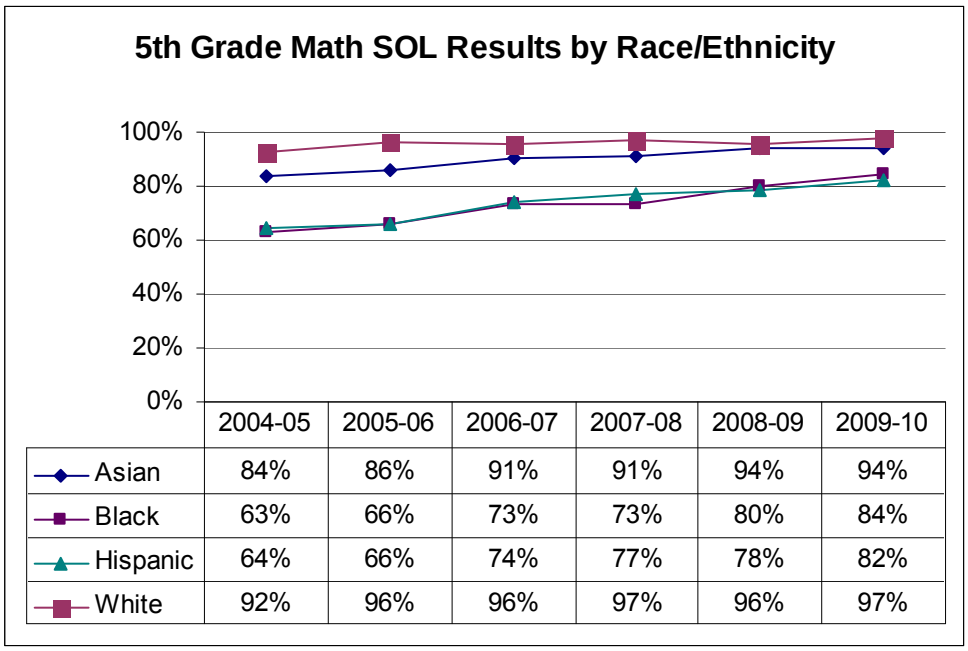
LEP Status	School Year	3rd Grade SOL		4th Grade SOL		5th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-LEP	2004-05	838	93%	-	-	908	86%
	2005-06	873	96%	849	86%	774	91%
	2006-07	868	94%	868	90%	877	92%
	2007-08	937	93%	880	88%	904	94%
	2008-09	926	94%	952	89%	899	94%
	2009-10	1062	97%	939	90%	960	95%
LEP	2004-05	520	77%	-	-	520	66%
	2005-06	460	83%	460	60%	471	68%
	2006-07	458	80%	455	66%	403	75%
	2007-08	489	79%	454	72%	408	77%
	2008-09	514	82%	467	70%	425	80%
	2009-10	557	89%	507	78%	439	83%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	93%	95%	97%	92%	92%	96%
Black	79%	88%	75%	76%	77%	83%
Hispanic	73%	81%	75%	75%	81%	88%
White	97%	97%	97%	97%	97%	98%



	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	77%	86%	91%	90%	92%
Black	57%	71%	61%	69%	77%
Hispanic	60%	61%	66%	63%	74%
White	92%	94%	94%	94%	93%



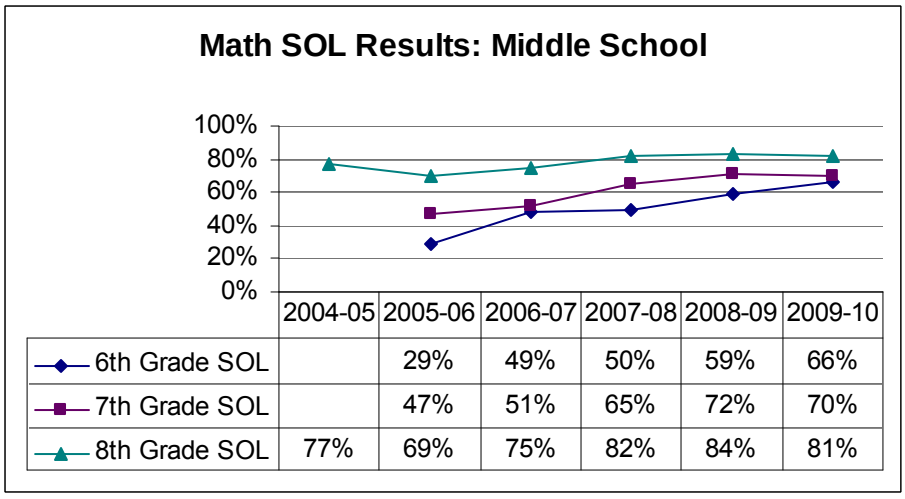
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	84%	86%	91%	91%	94%	94%
Black	63%	66%	73%	73%	80%	84%
Hispanic	64%	66%	74%	77%	78%	82%
White	92%	96%	96%	97%	96%	97%

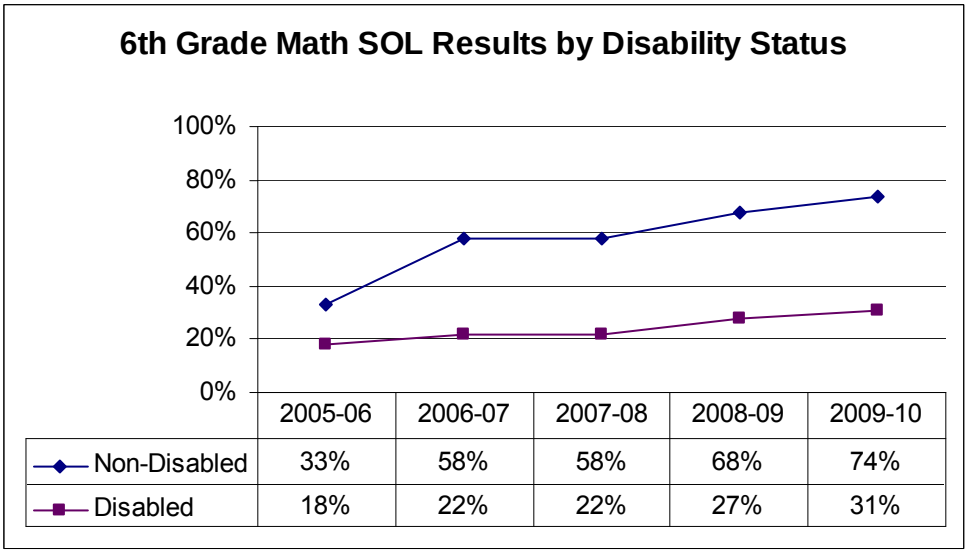
Elementary Math SOL Results by Race/Ethnicity

Race/ Ethnicity	School Year	3rd Grade SOL		4th Grade SOL		5th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Asian	2004-05	142	93%	-	-	148	84%
	2005-06	144	95%	149	77%	132	86%
	2006-07	152	97%	145	86%	149	91%
	2007-08	158	92%	149	91%	151	91%
	2008-09	153	92%	144	90%	137	94%
	2009-10	193	96%	158	92%	139	94%
Black	2004-05	186	79%	-	-	208	63%
	2005-06	177	88%	183	57%	172	66%
	2006-07	174	75%	167	71%	185	73%
	2007-08	173	76%	175	61%	164	73%
	2008-09	156	77%	171	69%	178	80%
	2009-10	174	83%	170	77%	183	84%
Hispanic	2004-05	385	73%	-	-	428	64%
	2005-06	354	81%	334	60%	368	66%
	2006-07	329	75%	340	61%	314	74%
	2007-08	348	75%	320	66%	337	77%
	2008-09	393	81%	355	63%	323	78%
	2009-10	375	88%	384	74%	342	82%
White	2004-05	642	97%	-	-	639	92%
	2005-06	650	97%	635	92%	566	96%
	2006-07	657	97%	663	94%	624	96%
	2007-08	728	97%	677	94%	652	97%
	2008-09	709	97%	728	94%	675	96%
	2009-10	848	98%	708	93%	715	97%
Other	2004-05	3	100%	-	-	5	100%
	2005-06	8	100%	8	88%	7	100%
	2006-07	14	100%	8	100%	8	100%
	2007-08	19	89%	13	92%	8	100%
	2008-09	29	93%	21	71%	11	91%
	2009-10	29	90%	26	81%	20	95%

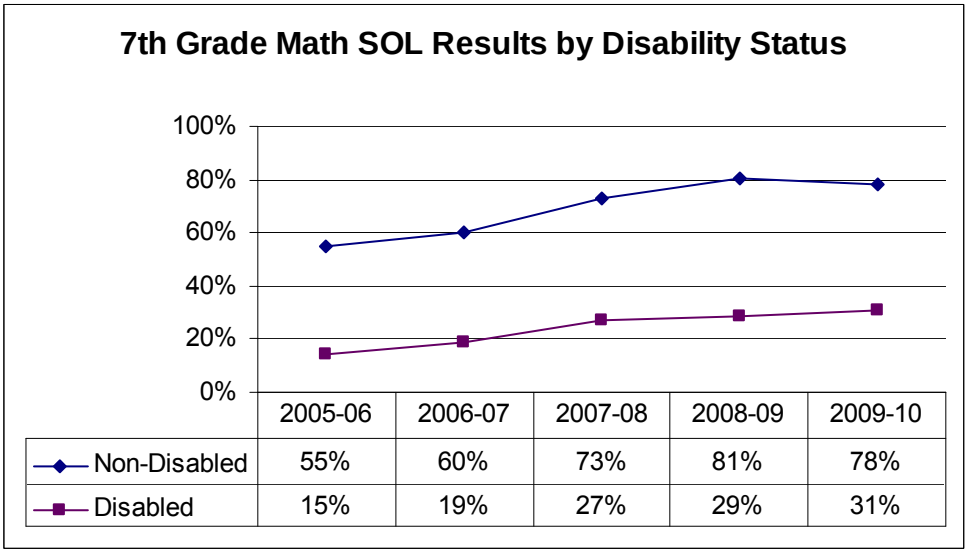
Math SOL Results: Middle School

School Year	6th Grade SOL		7th Grade SOL		8th Grade SOL	
	No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
2004-05	-	-	-	-	1296	77%
2005-06	703	29%	1133	47%	1049	69%
2006-07	754	49%	989	51%	1056	75%
2007-08	794	50%	1048	65%	1024	82%
2008-09	888	59%	1097	72%	1002	84%
2009-10	934	66%	1138	70%	1025	81%

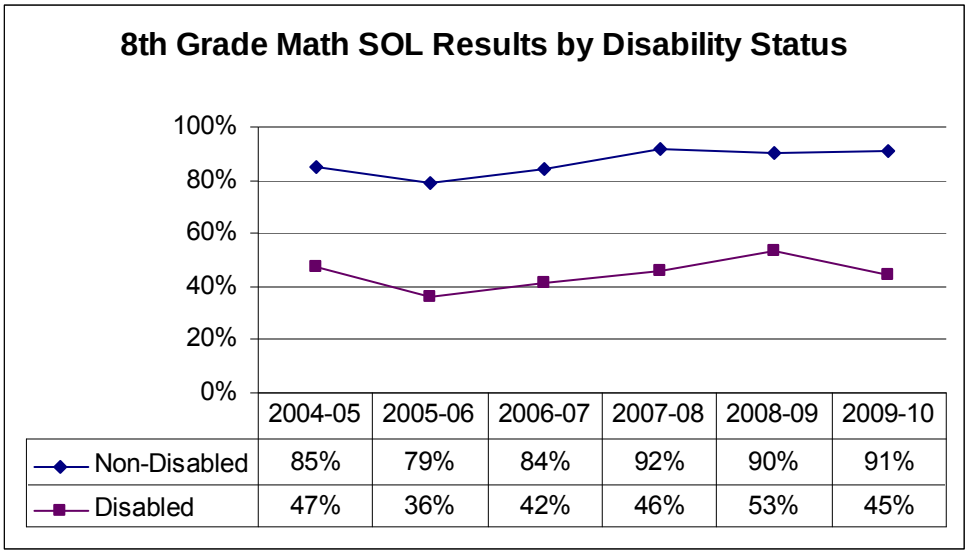




	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	33%	58%	58%	68%	74%
Disabled	18%	22%	22%	27%	31%



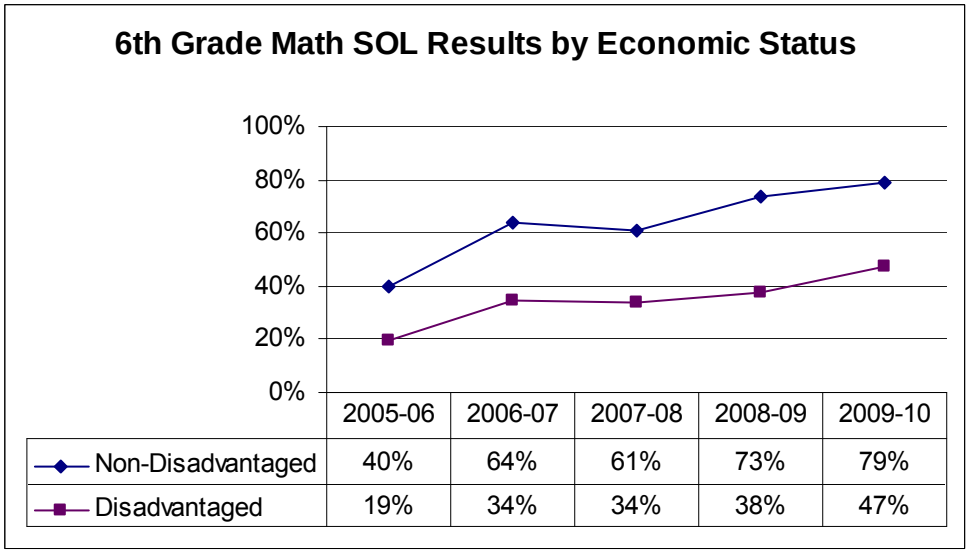
	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	55%	60%	73%	81%	78%
Disabled	15%	19%	27%	29%	31%



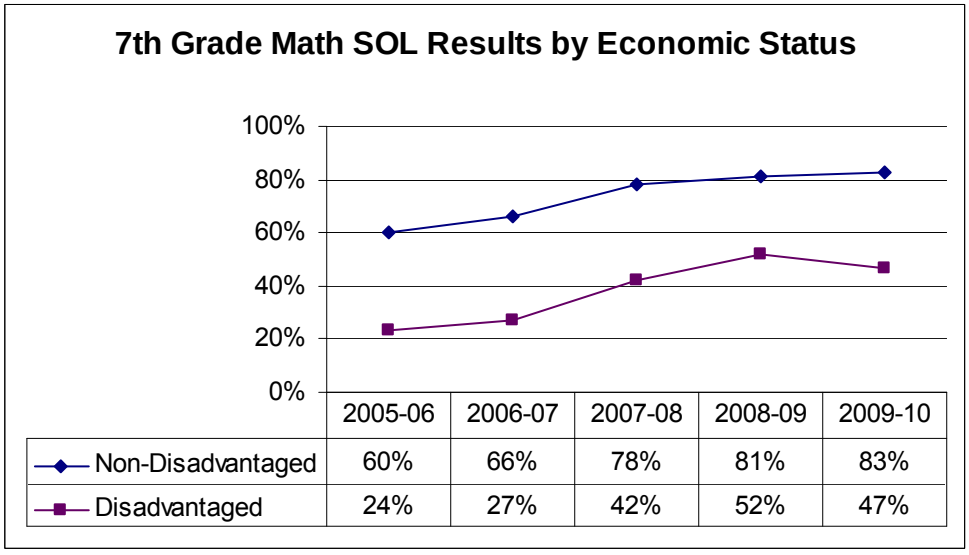
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	85%	79%	84%	92%	90%	91%
Disabled	47%	36%	42%	46%	53%	45%

Middle School Math SOL Results by Disability Status

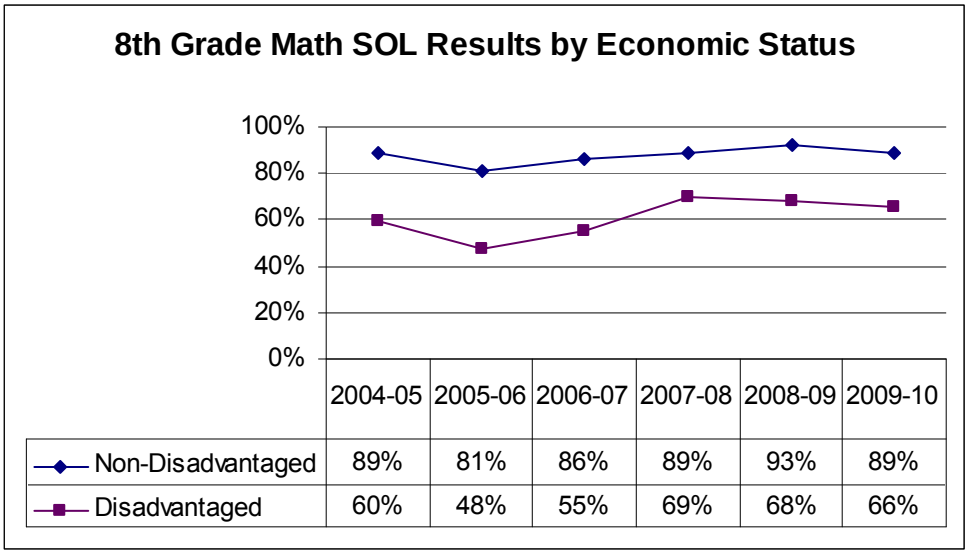
Disability Status	School Year	6th Grade SOL		7th Grade SOL		8th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-Disabled	2004-05	-	-	-	-	1024	85%
	2005-06	497	33%	906	55%	817	79%
	2006-07	566	58%	786	60%	832	84%
	2007-08	609	58%	874	73%	803	92%
	2008-09	695	68%	905	81%	833	90%
	2009-10	758	74%	935	78%	817	91%
Disabled	2004-05	-	-	-	-	272	47%
	2005-06	206	18%	227	15%	232	36%
	2006-07	188	22%	203	19%	224	42%
	2007-08	185	22%	174	27%	221	46%
	2008-09	193	27%	192	29%	169	53%
	2009-10	176	31%	203	31%	208	45%



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	40%	64%	61%	73%	79%
Disadvantaged	19%	34%	34%	38%	47%



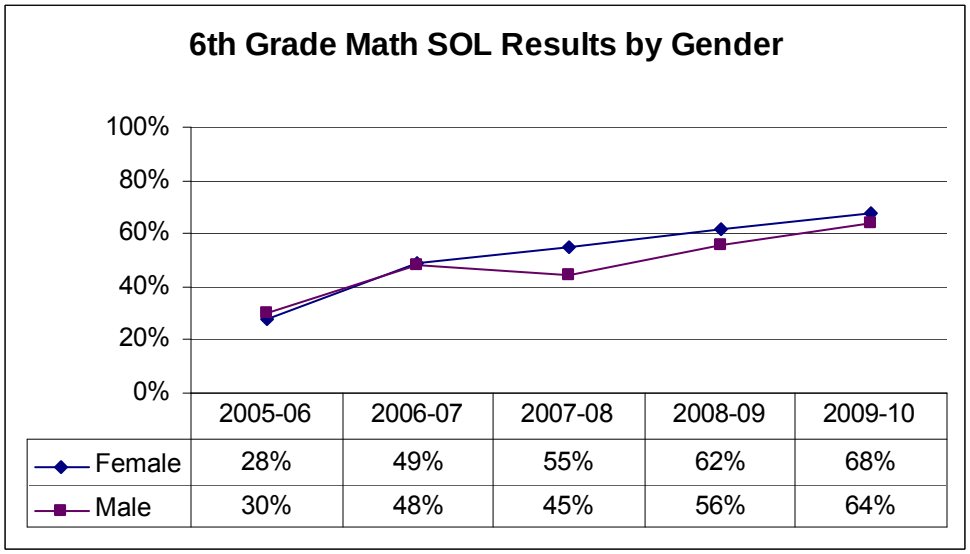
	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	60%	66%	78%	81%	83%
Disadvantaged	24%	27%	42%	52%	47%



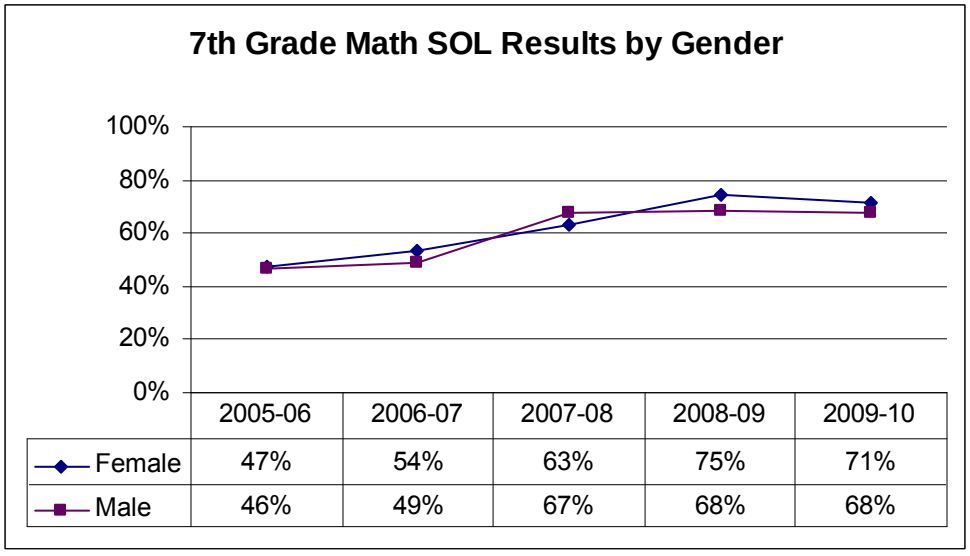
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	89%	81%	86%	89%	93%	89%
Disadvantaged	60%	48%	55%	69%	68%	66%

Middle School Math SOL Results by Economic Status

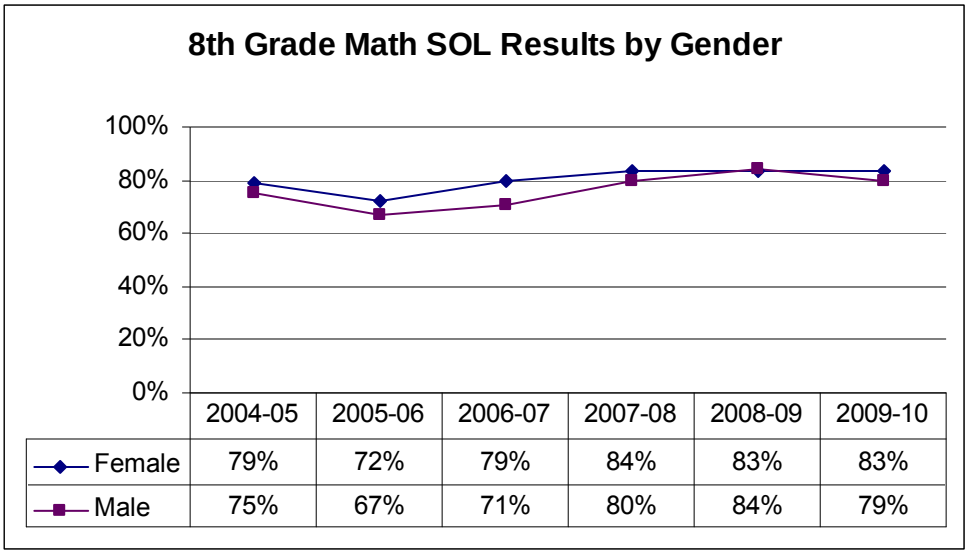
Economic Status	School Year	6th Grade SOL		7th Grade SOL		8th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-Disadvantaged	2004-05	-	-	-	-	775	89%
	2005-06	327	40%	712	60%	677	81%
	2006-07	365	64%	612	66%	675	86%
	2007-08	462	61%	673	78%	658	89%
	2008-09	526	73%	735	81%	642	93%
	2009-10	544	79%	726	83%	682	89%
Disadvantaged	2004-05	-	-	-	-	521	60%
	2005-06	376	19%	421	24%	372	48%
	2006-07	389	34%	377	27%	381	55%
	2007-08	332	34%	375	42%	366	69%
	2008-09	362	38%	362	52%	360	68%
	2009-10	390	47%	412	47%	343	66%



	2005-06	2006-07	2007-08	2008-09	2009-10
Female	28%	49%	55%	62%	68%
Male	30%	48%	45%	56%	64%



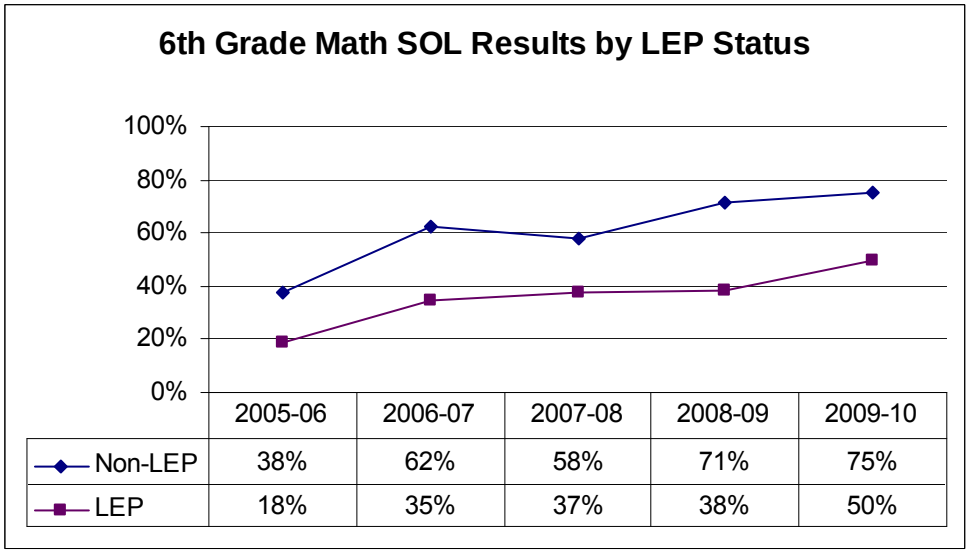
	2005-06	2006-07	2007-08	2008-09	2009-10
Female	47%	54%	63%	75%	71%
Male	46%	49%	67%	68%	68%



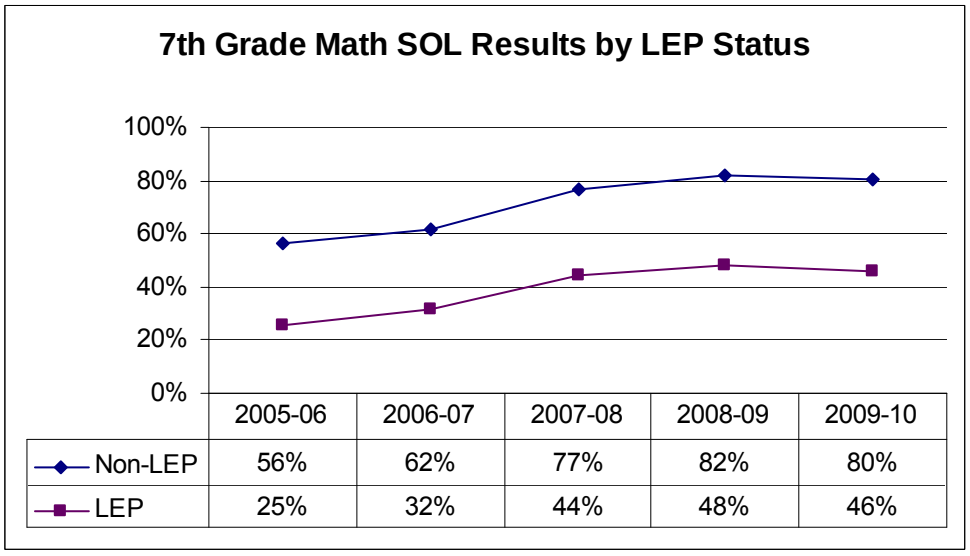
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Female	79%	72%	79%	84%	83%	83%
Male	75%	67%	71%	80%	84%	79%

Middle School Math SOL Results by Gender

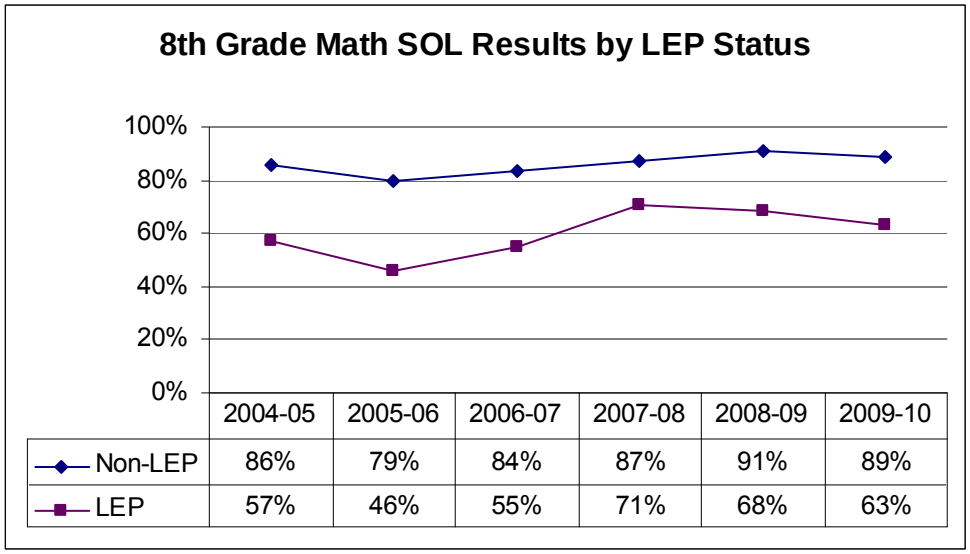
Gender	School Year	6th Grade SOL		7th Grade SOL		8th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Female	2004-05	-	-	-	-	628	79%
	2005-06	340	28%	566	47%	477	72%
	2006-07	398	49%	495	54%	508	79%
	2007-08	408	55%	516	63%	513	84%
	2008-09	436	62%	568	75%	484	83%
	2009-10	457	68%	537	71%	508	83%
Male	2004-05	-	-	-	-	668	75%
	2005-06	363	30%	567	46%	572	67%
	2006-07	356	48%	494	49%	548	71%
	2007-08	386	45%	532	67%	511	80%
	2008-09	452	56%	529	68%	518	84%
	2009-10	477	64%	601	68%	517	79%



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	38%	62%	58%	71%	75%
LEP	18%	35%	37%	38%	50%



	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	56%	62%	77%	82%	80%
LEP	25%	32%	44%	48%	46%

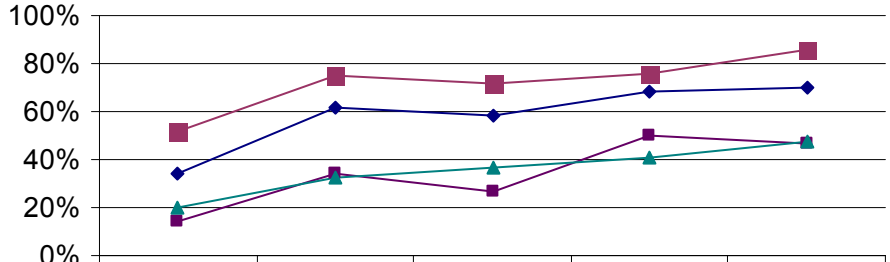


	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	86%	79%	84%	87%	91%	89%
LEP	57%	46%	55%	71%	68%	63%

Middle School Math SOL Results by Limited English Proficiency Status

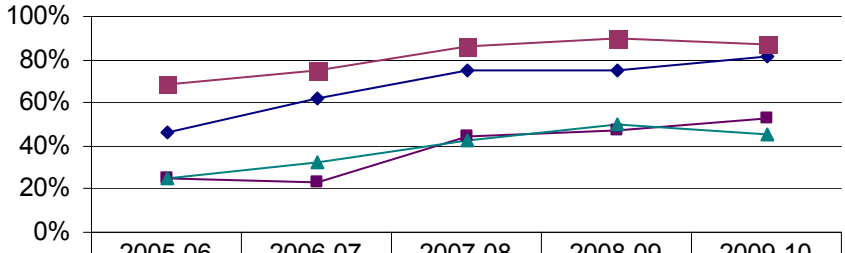
LEP Status	School Year	6th Grade SOL		7th Grade SOL		8th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-LEP	2004-05	-	-	-	-	911	86%
	2005-06	384	38%	779	56%	736	79%
	2006-07	382	62%	647	62%	732	84%
	2007-08	481	58%	686	77%	694	87%
	2008-09	554	71%	771	82%	692	91%
	2009-10	582	75%	784	80%	724	89%
LEP	2004-05	-	-	-	-	385	57%
	2005-06	319	18%	354	25%	313	46%
	2006-07	372	35%	342	32%	324	55%
	2007-08	313	37%	362	44%	330	71%
	2008-09	334	38%	326	48%	310	68%
	2009-10	352	50%	354	46%	301	63%

6th Grade Math SOL Results by Race/Ethnicity

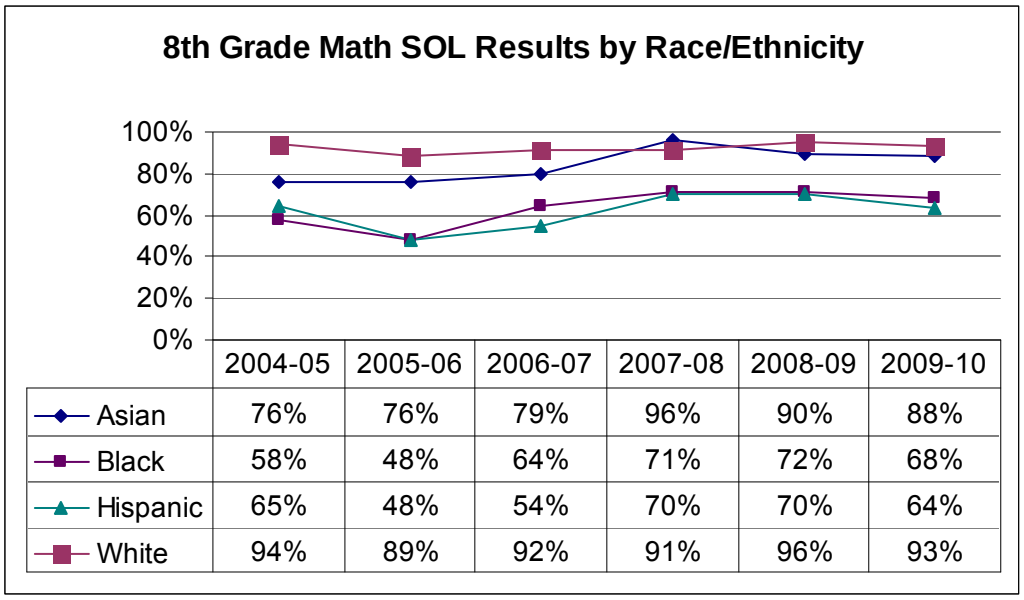


	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	34%	62%	59%	69%	70%
Black	14%	34%	26%	50%	47%
Hispanic	20%	32%	37%	41%	47%
White	52%	75%	72%	76%	86%

7th Grade Math SOL Results by Race/Ethnicity



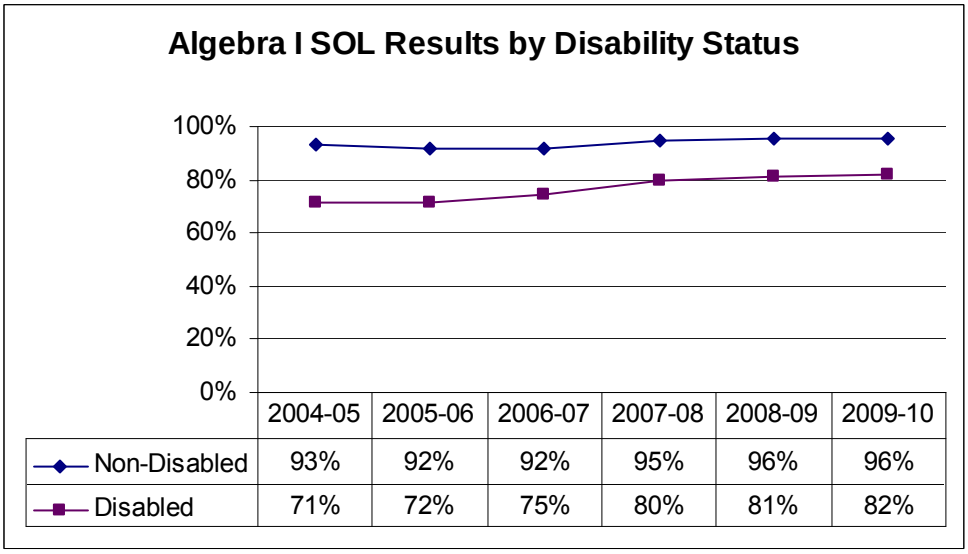
	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	47%	62%	75%	75%	82%
Black	25%	23%	45%	48%	53%
Hispanic	25%	32%	43%	50%	45%
White	69%	75%	86%	90%	87%



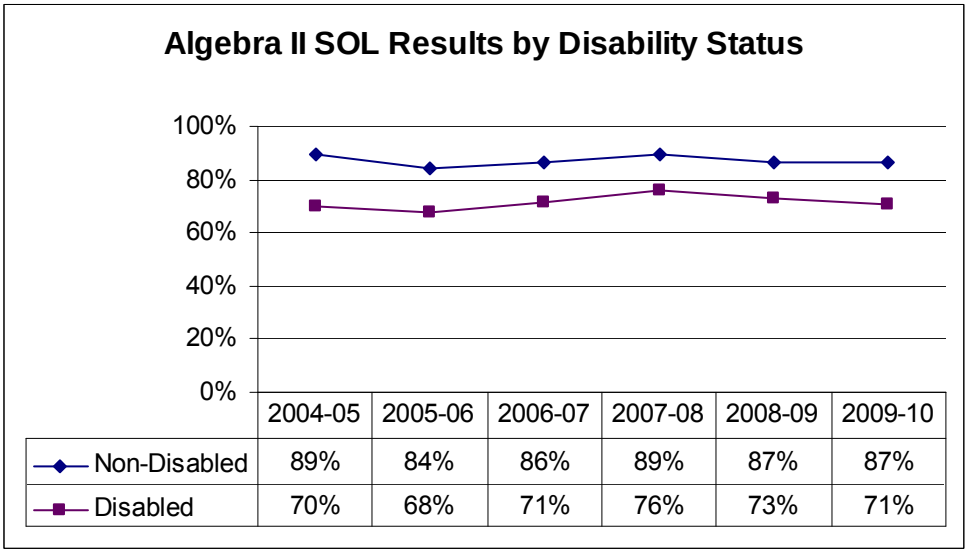
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	76%	76%	79%	96%	90%	88%
Black	58%	48%	64%	71%	72%	68%
Hispanic	65%	48%	54%	70%	70%	64%
White	94%	89%	92%	91%	96%	93%

Middle School Math SOL Results by Race/Ethnicity

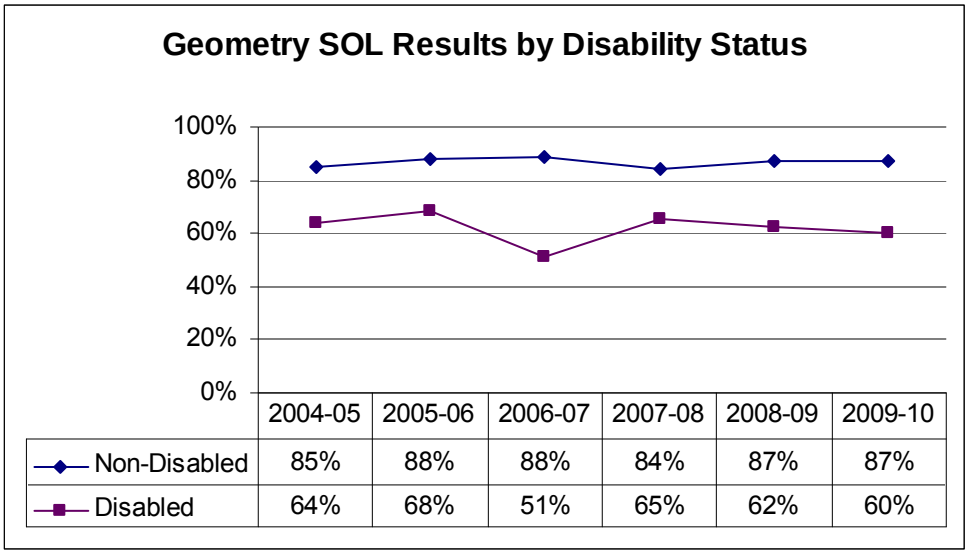
Race/ Ethnicity	School Year	6th Grade SOL		7th Grade SOL		8th Grade SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Asian	2004-05	-	-	-	-	120	76%
	2005-06	71	34%	118	47%	114	76%
	2006-07	81	62%	103	62%	112	79%
	2007-08	94	59%	121	75%	107	96%
	2008-09	96	69%	122	75%	108	90%
	2009-10	96	70%	125	82%	120	88%
Black	2004-05	-	-	-	-	198	58%
	2005-06	166	14%	189	25%	176	48%
	2006-07	146	34%	180	23%	173	64%
	2007-08	144	26%	166	45%	190	71%
	2008-09	143	50%	149	48%	169	72%
	2009-10	166	47%	156	53%	139	68%
Hispanic	2004-05	-	-	-	-	423	65%
	2005-06	275	20%	320	25%	290	48%
	2006-07	299	32%	292	32%	305	54%
	2007-08	271	37%	305	43%	305	70%
	2008-09	303	41%	297	50%	281	70%
	2009-10	280	47%	334	45%	276	64%
White	2004-05	-	-	-	-	549	94%
	2005-06	186	52%	502	69%	460	89%
	2006-07	224	75%	410	75%	460	92%
	2007-08	277	72%	451	86%	417	91%
	2008-09	341	76%	520	90%	437	96%
	2009-10	388	86%	514	87%	481	93%
Other	2004-05	-	-	-	-	6	67%
	2005-06	5	60%	4	25%	9	100%
	2006-07	4	75%	4	50%	6	67%
	2007-08	8	50%	5	80%	5	100%
	2008-09	5	60%	9	78%	7	86%
	2009-10	4	75%	9	89%	9	100%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	93%	92%	92%	95%	96%	96%
Disabled	71%	72%	75%	80%	81%	82%



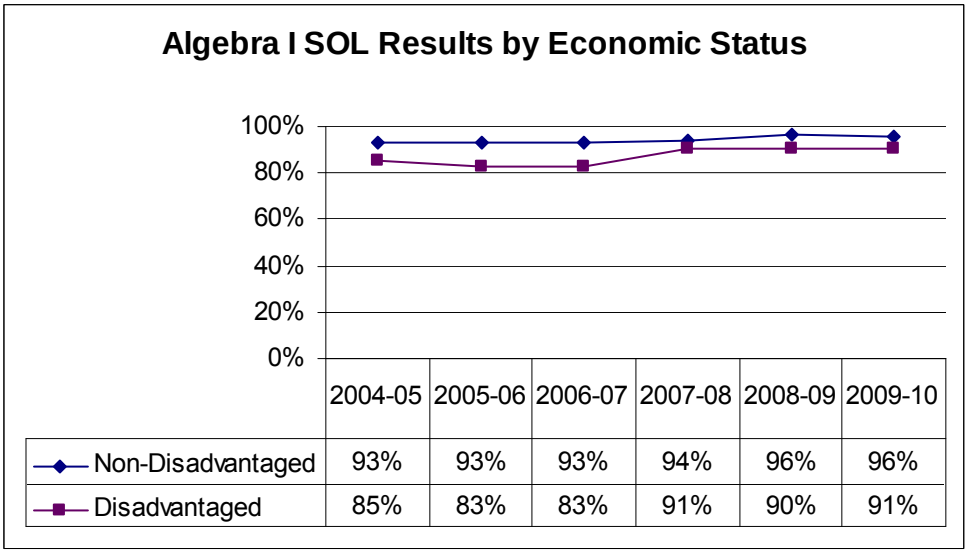
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	89%	84%	86%	89%	87%	87%
Disabled	70%	68%	71%	76%	73%	71%



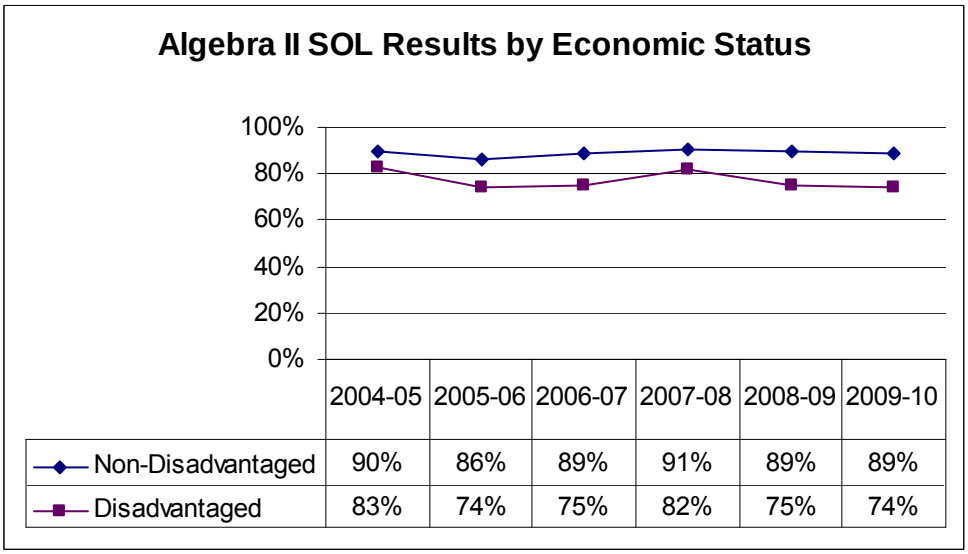
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disabled	85%	88%	88%	84%	87%	87%
Disabled	64%	68%	51%	65%	62%	60%

End of Course Math SOL Results by Disability Status

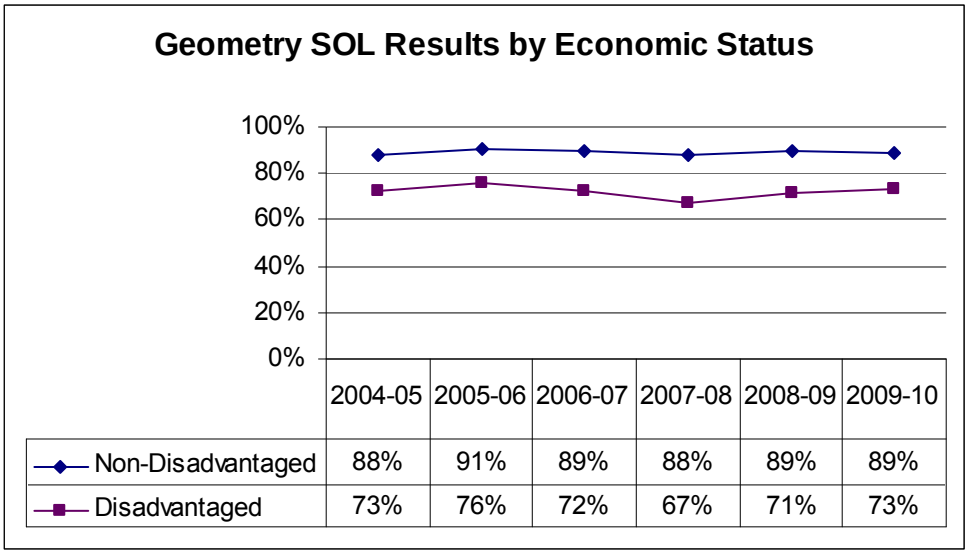
Disability Status	School Year	Algebra I SOL		Algebra II SOL		Geometry SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-Disabled	2004-05	1314	93%	1019	89%	1183	85%
	2005-06	1229	92%	1028	84%	1175	88%
	2006-07	1288	92%	1045	86%	1075	88%
	2007-08	1237	95%	1007	89%	1204	84%
	2008-09	1221	96%	1114	87%	1155	87%
	2009-10	1292	96%	1016	87%	1068	87%
Disabled	2004-05	167	71%	67	70%	113	64%
	2005-06	151	72%	65	68%	107	68%
	2006-07	153	75%	56	71%	115	51%
	2007-08	158	80%	62	76%	123	65%
	2008-09	149	81%	84	73%	137	62%
	2009-10	164	82%	114	71%	129	60%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	93%	93%	93%	94%	96%	96%
Disadvantaged	85%	83%	83%	91%	90%	91%



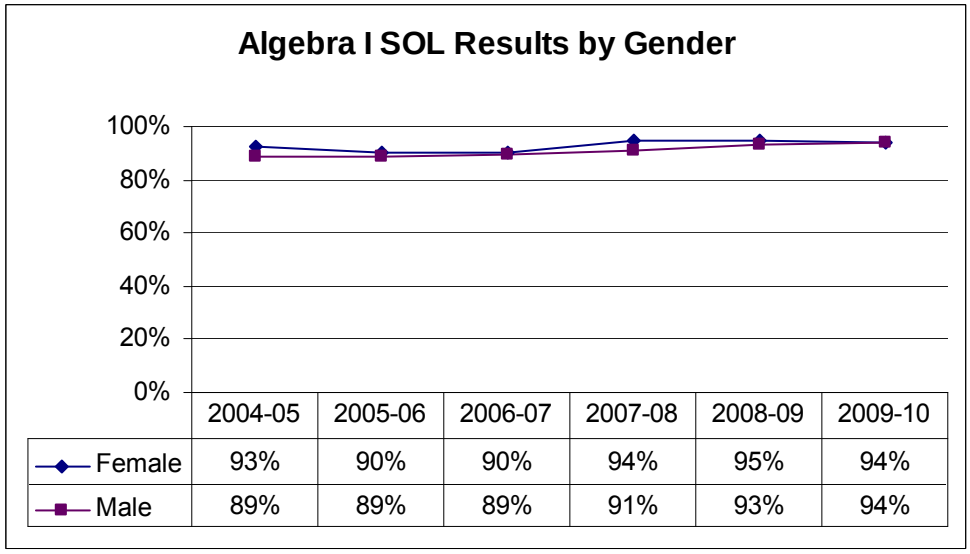
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	90%	86%	89%	91%	89%	89%
Disadvantaged	83%	74%	75%	82%	75%	74%



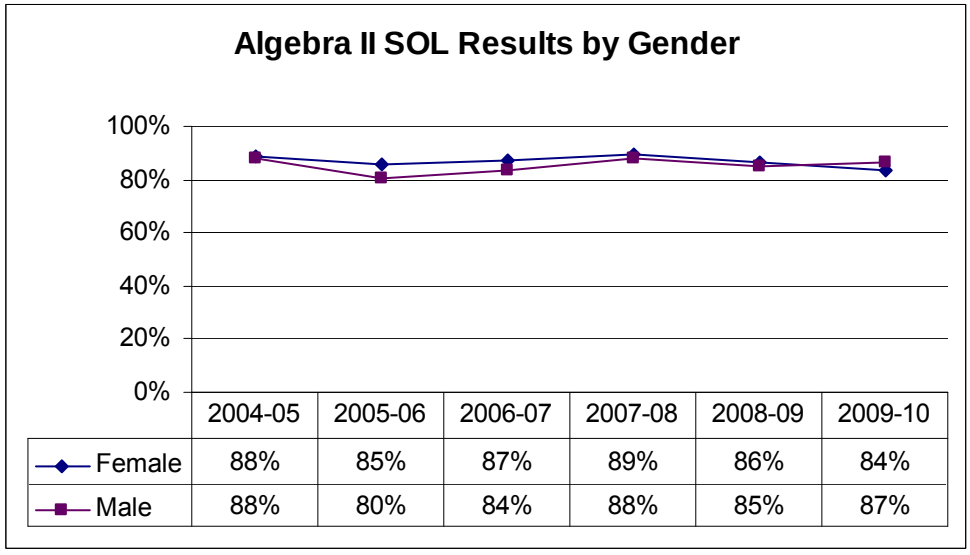
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-Disadvantaged	88%	91%	89%	88%	89%	89%
Disadvantaged	73%	76%	72%	67%	71%	73%

End of Course Math SOL Results by Economic Status

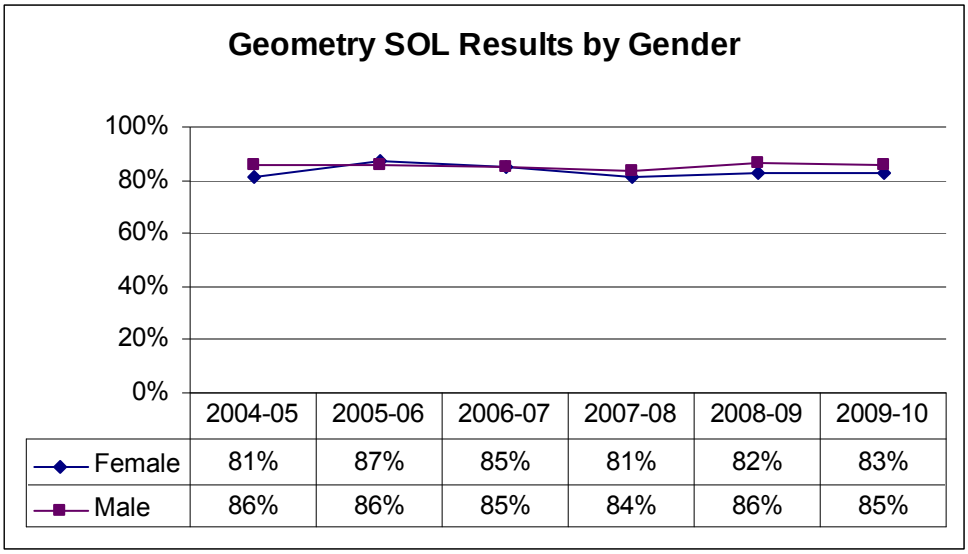
Economic Status	School Year	Algebra I SOL		Algebra II SOL		Geometry SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-Disadvantaged	2004-05	1010	93%	814	90%	917	88%
	2005-06	915	93%	803	86%	917	91%
	2006-07	993	93%	827	89%	871	89%
	2007-08	995	94%	821	91%	980	88%
	2008-09	905	96%	878	89%	930	89%
	2009-10	987	96%	844	89%	832	89%
Disadvantaged	2004-05	471	85%	272	83%	379	73%
	2005-06	465	83%	290	74%	365	76%
	2006-07	448	83%	274	75%	319	72%
	2007-08	400	91%	248	82%	347	67%
	2008-09	465	90%	320	75%	362	71%
	2009-10	469	91%	286	74%	365	73%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Female	93%	90%	90%	94%	95%	94%
Male	89%	89%	89%	91%	93%	94%



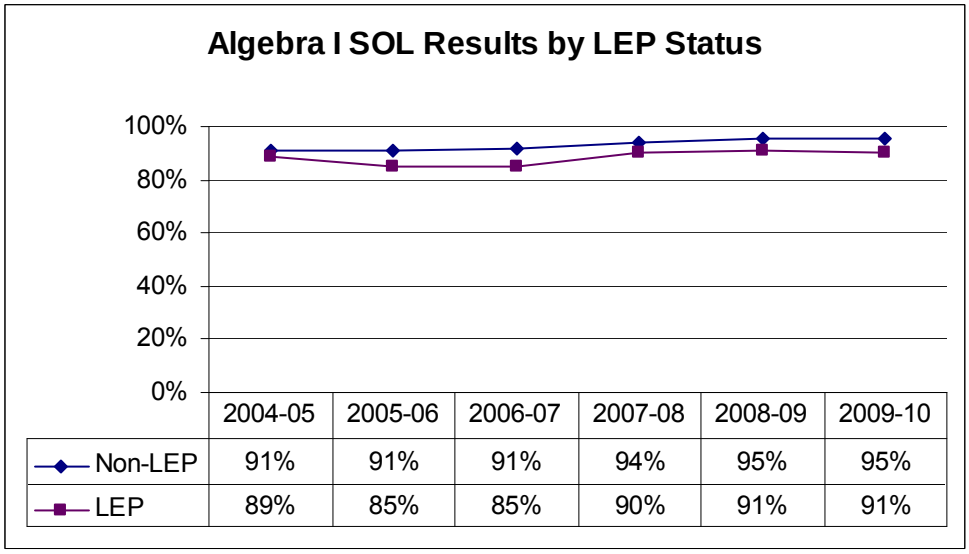
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Female	88%	85%	87%	89%	86%	84%
Male	88%	80%	84%	88%	85%	87%



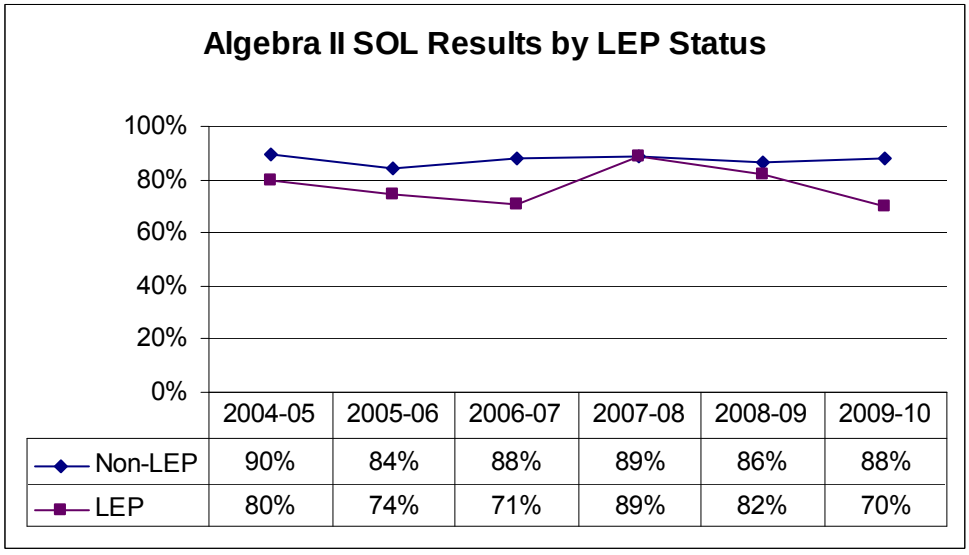
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Female	81%	87%	85%	81%	82%	83%
Male	86%	86%	85%	84%	86%	85%

End of Course Math SOL Results by Gender

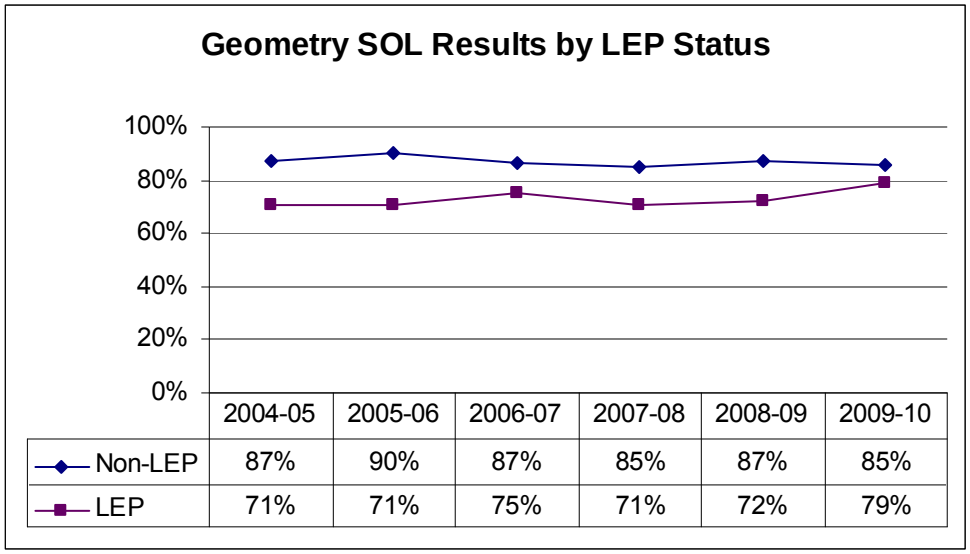
Gender	School Year	Algebra I SOL		Algebra II SOL		Geometry SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Female	2004-05	749	93%	570	88%	672	81%
	2005-06	691	90%	564	85%	639	87%
	2006-07	712	90%	550	87%	602	85%
	2007-08	701	94%	551	89%	659	81%
	2008-09	692	95%	606	86%	643	82%
	2009-10	718	94%	593	84%	604	83%
Male	2004-05	732	89%	516	88%	624	86%
	2005-06	689	89%	529	80%	643	86%
	2006-07	729	89%	551	84%	588	85%
	2007-08	694	91%	518	88%	668	84%
	2008-09	678	93%	592	85%	649	86%
	2009-10	738	94%	537	87%	593	85%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	91%	91%	91%	94%	95%	95%
LEP	89%	85%	85%	90%	91%	91%



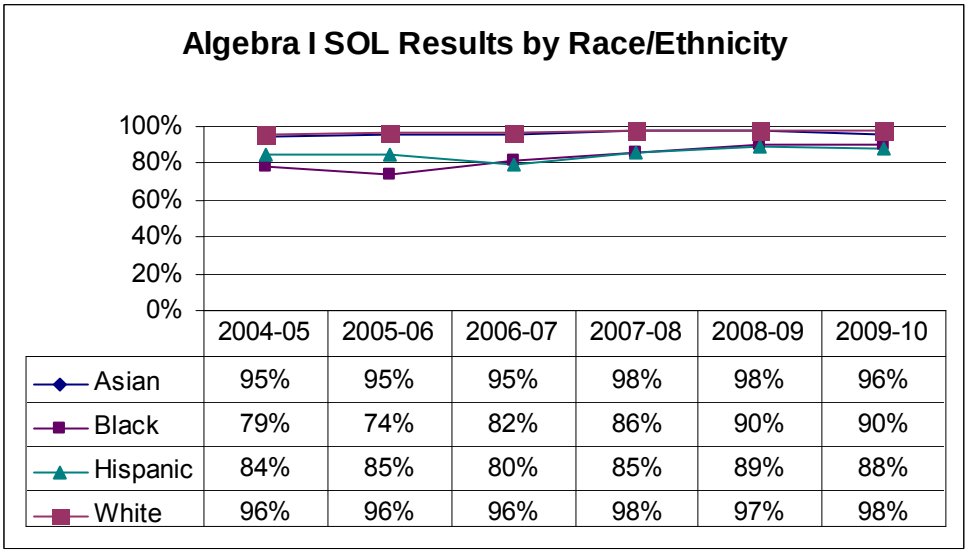
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	90%	84%	88%	89%	86%	88%
LEP	80%	74%	71%	89%	82%	70%



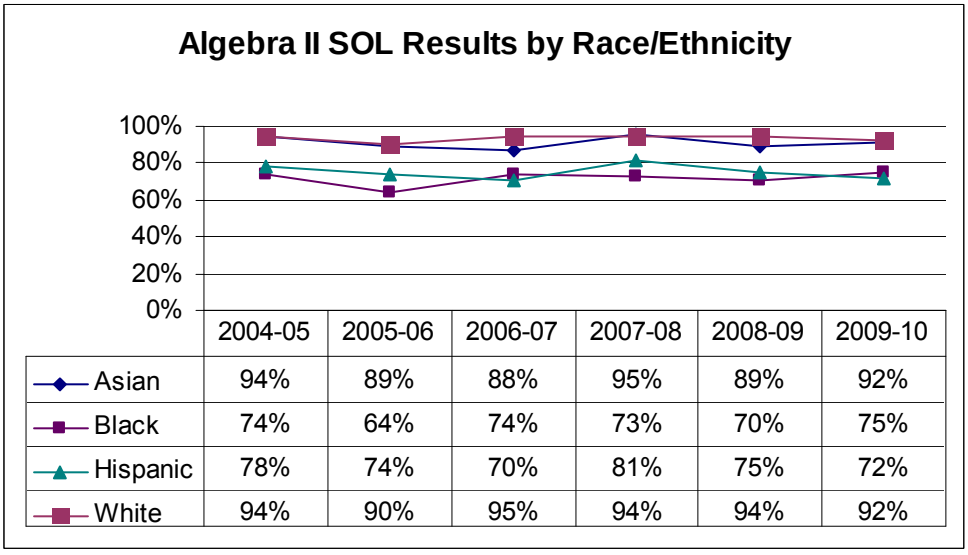
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Non-LEP	87%	90%	87%	85%	87%	85%
LEP	71%	71%	75%	71%	72%	79%

End of Course Math SOL Results by Limited English Proficiency Status

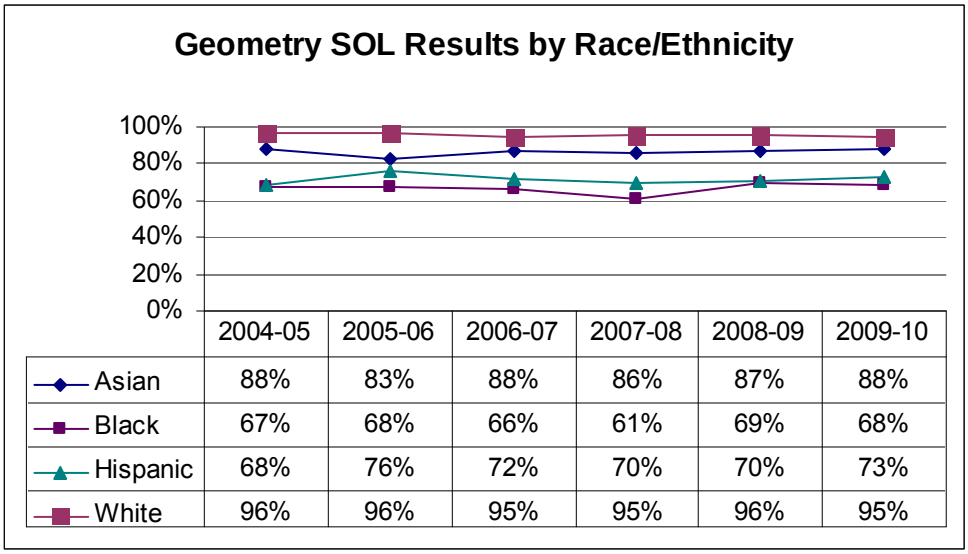
LEP Status	School Year	Algebra I SOL		Algebra II SOL		Geometry SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Non-LEP	2004-05	1095	91%	902	90%	1004	87%
	2005-06	1029	91%	922	84%	1037	90%
	2006-07	1077	91%	934	88%	986	87%
	2007-08	994	94%	894	89%	1063	85%
	2008-09	999	95%	1000	86%	1033	87%
	2009-10	1077	95%	962	88%	959	85%
LEP	2004-05	386	89%	184	80%	292	71%
	2005-06	351	85%	171	74%	245	71%
	2006-07	364	85%	167	71%	204	75%
	2007-08	401	90%	175	89%	264	71%
	2008-09	371	91%	198	82%	259	72%
	2009-10	379	91%	168	70%	238	79%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	95%	95%	95%	98%	98%	96%
Black	79%	74%	82%	86%	90%	90%
Hispanic	84%	85%	80%	85%	89%	88%
White	96%	96%	96%	98%	97%	98%



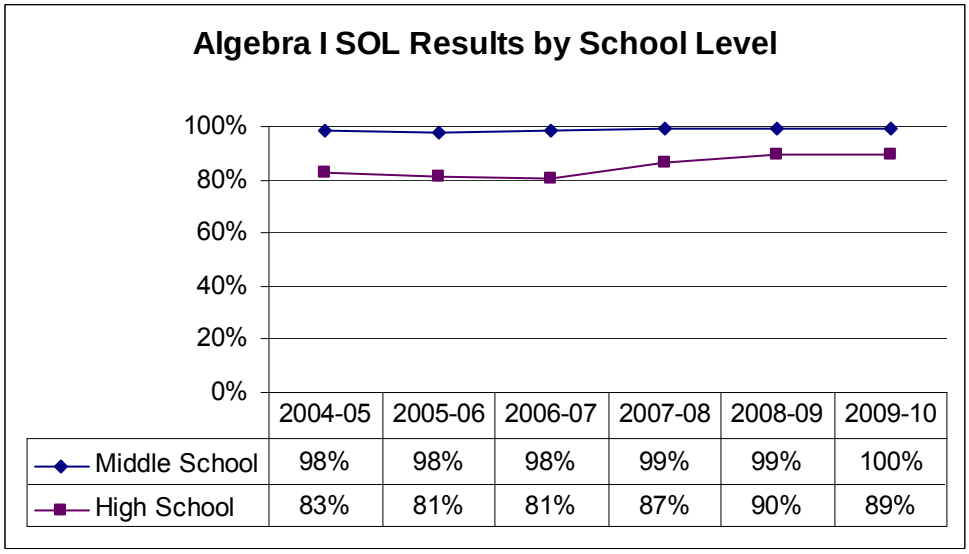
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	94%	89%	88%	95%	89%	92%
Black	74%	64%	74%	73%	70%	75%
Hispanic	78%	74%	70%	81%	75%	72%
White	94%	90%	95%	94%	94%	92%



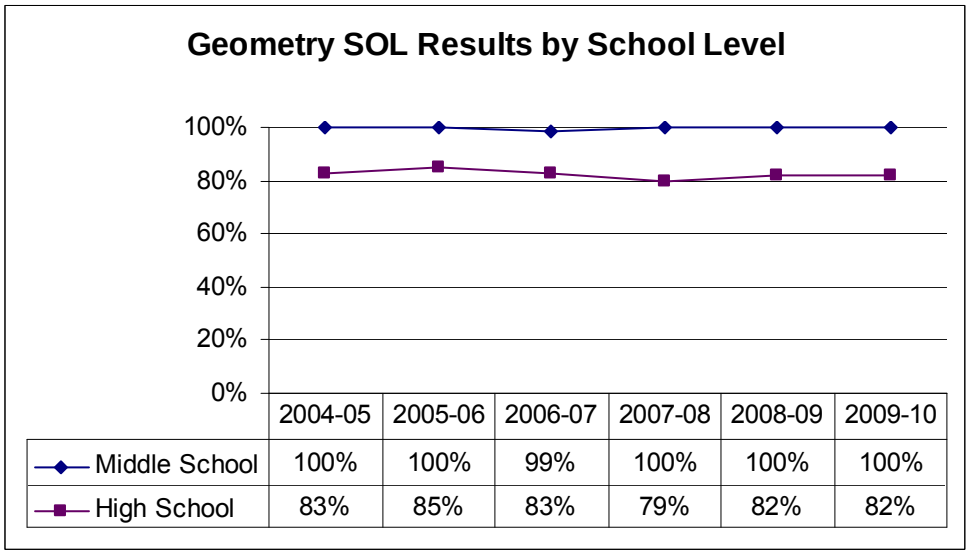
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Asian	88%	83%	88%	86%	87%	88%
Black	67%	68%	66%	61%	69%	68%
Hispanic	68%	76%	72%	70%	70%	73%
White	96%	96%	95%	95%	96%	95%

End of Course Math SOL Results by Race/Ethnicity

Race/ Ethnicity	School Year	Algebra I SOL		Algebra II SOL		Geometry SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Asian	2004-05	181	95%	137	94%	136	88%
	2005-06	153	95%	129	89%	142	83%
	2006-07	187	95%	120	88%	136	88%
	2007-08	176	98%	127	95%	166	86%
	2008-09	184	98%	163	89%	168	87%
	2009-10	171	96%	146	92%	143	88%
Black	2004-05	174	79%	132	74%	201	67%
	2005-06	204	74%	149	64%	139	68%
	2006-07	229	82%	127	74%	170	66%
	2007-08	200	86%	134	73%	219	61%
	2008-09	219	90%	178	70%	183	69%
	2009-10	237	90%	154	75%	187	68%
Hispanic	2004-05	404	84%	242	78%	344	68%
	2005-06	384	85%	241	74%	337	76%
	2006-07	349	80%	261	70%	275	72%
	2007-08	369	85%	234	81%	313	70%
	2008-09	370	89%	267	75%	321	70%
	2009-10	369	88%	254	72%	315	73%
White	2004-05	713	96%	573	94%	610	96%
	2005-06	627	96%	570	90%	655	96%
	2006-07	665	96%	585	95%	600	95%
	2007-08	644	98%	564	94%	619	95%
	2008-09	589	97%	580	94%	612	96%
	2009-10	665	98%	571	92%	539	95%
Other	2004-05	9	100%	2	100%	5	80%
	2005-06	12	92%	4	75%	9	89%
	2006-07	11	100%	8	75%	9	100%
	2007-08	6	83%	10	70%	10	70%
	2008-09	8	100%	10	80%	8	75%
	2009-10	14	93%	5	100%	13	77%



	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Middle School	98%	98%	98%	99%	99%	100%
High School	83%	81%	81%	87%	90%	89%



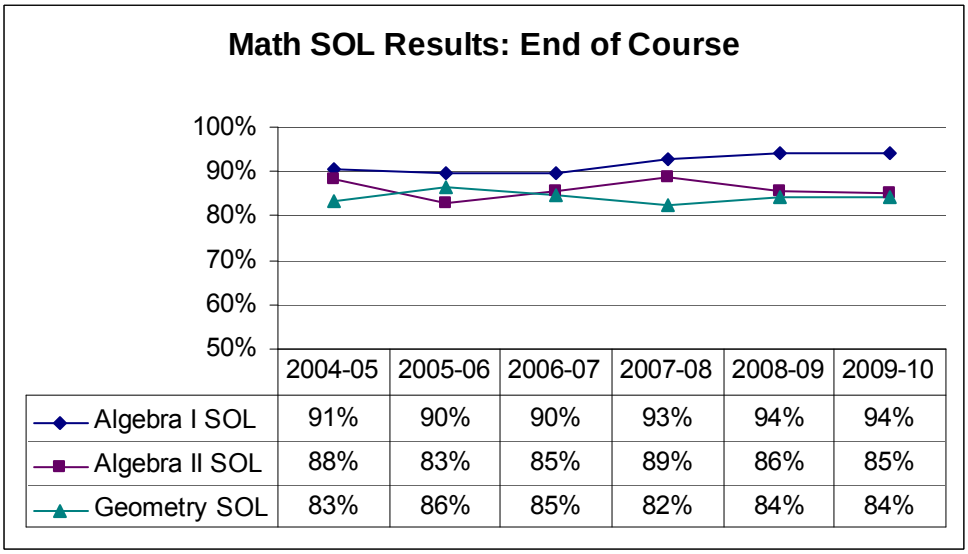
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Middle School	100%	100%	99%	100%	100%	100%
High School	83%	85%	83%	79%	82%	82%

End of Course Math SOL Results by School Level

Level	School Year	Algebra I SOL		Algebra II SOL		Geometry SOL	
		No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
Middle School	2004-05	737	98%	-	-	57	100%
	2005-06	684	98%	1	100%	139	100%
	2006-07	751	98%	3	100%	151	99%
	2007-08	702	99%	3	100%	192	100%
	2008-09	647	99%	2	100%	180	100%
	2009-10	692	100%	3	100%	129	100%
High Schol	2004-05	744	83%	1086	88%	1239	83%
	2005-06	696	81%	1092	83%	1143	85%
	2006-07	690	81%	1098	85%	1039	83%
	2007-08	693	87%	1066	89%	1134	79%
	2008-09	723	90%	1196	86%	1112	82%
	2009-10	763	89%	1126	85%	1068	82%

Math SOL Results: End of Course

School Year	Algebra I SOL		Algebra II SOL		Geometry SOL	
	No. Tested	Percent Passing	No. Tested	Percent Passing	No. Tested	Percent Passing
2004-05	1481	91%	1086	88%	1296	83%
2005-06	1380	90%	1093	83%	1282	86%
2006-07	1441	90%	1101	85%	1190	85%
2007-08	1395	93%	1069	89%	1327	82%
2008-09	1370	94%	1198	86%	1292	84%
2009-10	1456	94%	1130	85%	1197	84%



Appendix G: AP& IB Results

Math AP Pass Rates, Overall

Test	School Year	No. Tested	% Passing
Calculus AB	2009-10	172	62.8
	2008-09	202	62.9
	2007-08	136	59.6
	2006-07	113	62.8
	2005-06	136	54.4
	2004-05	108	48.1
Calculus BC	2009-10	115	78.3
	2008-09	125	81.6
	2007-08	72	77.8
	2006-07	92	81.5
	2005-06	63	79.4
	2004-05	68	75.0
Statistics	2009-10	133	60.2
	2008-09	98	59.2
	2007-08	89	62.9
	2006-07	98	58.2
	2005-06	75	54.7
	2004-05	75	50.7

Math AP Pass Rates, by Race

Test	School Year	Race	No. Tested	% Passing
Calculus AB	2009-10	Asian	27	51.9
	2008-09		27	59.3
	2007-08		18	38.9
	2006-07		10	50.0
	2005-06		13	30.8
	2004-05		9	55.6
	2009-10	Black	5	20.0
	2008-09		10	30.0
	2007-08		9	44.4
	2006-07		1	100.0
	2005-06		6	33.3
	2004-05		6	50.0
	2009-10	Hispanic	12	50.0
	2008-09		29	31.0
	2007-08		11	63.6
	2006-07		4	25.0
	2005-06		8	25.0
	2004-05		17	17.6
	2009-10	White	125	69.6
	2008-09		133	72.9
	2007-08		85	64.7
	2006-07		98	65.3
	2005-06		108	60.2
	2004-05		66	57.6
	2009-10	Other	3	.0
	2008-09		3	66.7
	2007-08		8	62.5
	2006-07		0	n/a
	2005-06		0	n/a
	2004-05		10	30.0
Calculus BC	2009-10	Asian	20	75.0
	2008-09		17	88.2
	2007-08		15	80.0
	2006-07		14	78.6
	2005-06		8	100.0
	2004-05		18	66.7
	2009-10	Black	4	50.0
	2008-09		6	33.3
	2007-08		2	50.0
	2006-07		2	50.0
	2005-06		2	50.0
	2004-05		1	.0
	2009-10	Hispanic	13	69.2
	2008-09		5	80.0
	2007-08		5	40.0
	2006-07		4	25.0
	2005-06		2	.0
	2004-05		8	75.0
	2009-10	White	77	81.8
	2008-09		95	83.2
	2007-08		43	83.7
	2006-07		72	86.1
	2005-06		40	81.6
	2004-05		38	81.6
	2009-10	Other	1	100.0
	2008-09		2	100.0
	2007-08		4	50.0
	2006-07		0	n/a
	2005-06		0	n/a
	2004-05		3	66.7

Test	School Year	Race	No. Tested	% Passing
Statistics	2009-10	Asian	21	47.6
	2008-09		14	42.9
	2007-08		7	71.4
	2006-07		11	45.5
	2005-06		6	66.7
	2004-05		10	80.0
	2009-10	Black	7	42.9
	2008-09		7	28.6
	2007-08		9	22.2
	2006-07		7	14.3
	2005-06		3	.0
	2004-05		2	50.0
	2009-10	Hispanic	20	30.0
	2008-09		5	60.0
	2007-08		5	20.0
	2006-07		11	18.2
	2005-06		5	20.0
	2004-05		10	30.0
	2009-10	White	83	72.3
	2008-09		71	66.2
	2007-08		58	72.4
	2006-07		69	71.0
	2005-06		61	59.0
	2004-05		48	52.1
	2009-10	Other	2	50.0
	2008-09		1	.0
	2007-08		4	50.0
	2006-07		0	n/a
	2005-06		0	n/a
	2004-05		5	20.0

Math AP Pass Rates, by Gender

Test	School Year	Gender	No. Tested	% Passing
Calculus AB	2009-10	Female	94	61.7
	2008-09		99	58.6
	2007-08		62	59.7
	2006-07		59	55.9
	2005-06		82	47.6
	2004-05		51	47.1
	2009-10	Male	78	64.1
	2008-09		103	67.0
	2007-08		74	59.5
	2006-07		54	70.4
	2005-06		54	64.8
	2004-05		57	49.1
Calculus BC	2009-10	Female	50	72.0
	2008-09		58	75.9
	2007-08		39	74.4
	2006-07		42	78.6
	2005-06		26	84.6
	2004-05		36	69.4
	2009-10	Male	65	83.1
	2008-09		67	86.6
	2007-08		33	81.8
	2006-07		50	84.0
	2005-06		37	75.7
	2004-05		32	81.3
Statistics	2009-10	Female	74	54.1
	2008-09		52	53.8
	2007-08		45	64.4
	2006-07		50	62.0
	2005-06		39	59.0
	2004-05		44	68.2
	2009-10	Male	59	67.8
	2008-09		46	65.2
	2007-08		44	61.4
	2006-07		48	54.2
	2005-06		36	50.0
	2004-05		31	25.8

Math AP Pass Rates, by Disability Status

Test	School Year	Disability Status	No. Tested	% Passing
Calculus AB	2009-10	Non-Disabled	168	63.1
	2008-09		199	62.8
	2006-07		112	63.4
	2005-06		134	54.5
	2009-10	Disabled	2	50.0
	2008-09		3	66.7
	2006-07		1	.0
	2005-06		1	.0
Calculus BC	2009-10	Non-Disabled	112	77.7
	2008-09		122	82.0
	2006-07		89	80.9
	2005-06		63	79.4
	2009-10	Disabled	3	100.0
	2008-09		3	66.7
	2006-07		3	100.0
	2005-06		0	n/a
Statistics	2009-10	Non-Disabled	131	60.3
	2008-09		97	58.8
	2006-07		95	58.9
	2005-06		73	54.8
	2009-10	Disabled	2	50.0
	2008-09		1	100.0
	2006-07		3	33.3
	2005-06		2	50.0

Math AP Pass Rates, by LEP Status

Test	School Year	LEP Status	No. Tested	% Passing
Calculus AB	2009-10	Non-LEP	163	63.8
	2008-09		183	66.1
	2006-07		108	63.9
	2005-06		130	53.8
	2009-10	LEP	9	44.4
	2008-09		19	31.6
	2006-07		5	40.0
	2005-06		5	60.0
Calculus BC	2009-10	Non-LEP	105	79.0
	2008-09		117	82.9
	2006-07		86	80.2
	2005-06		57	78.9
	2009-10	LEP	10	70.0
	2008-09		8	62.5
	2006-07		6	100.0
	2005-06		6	83.3
Statistics	2009-10	Non-LEP	125	62.4
	2008-09		91	59.3
	2006-07		94	59.6
	2005-06		75	54.7
	2009-10	LEP	8	25.0
	2008-09		7	57.1
	2006-07		4	25.0
	2005-06		0	n/a

Math AP Pass Rates, by Economic Status

Test	School Year	Economic Status	No. Tested	% Passing
Calculus AB	2009-10	Non-Disadvantaged	160	64.4
	2008-09		167	70.7
	2006-07		107	65.4
	2005-06		125	55.2
	2009-10	Disadvantaged	12	41.7
	2008-09		35	25.7
	2006-07		6	16.7
	2005-06		10	40.0
Calculus BC	2009-10	Non-Disadvantaged	98	83.7
	2008-09		113	84.1
	2006-07		81	82.7
	2005-06		56	80.4
	2009-10	Disadvantaged	17	47.1
	2008-09		12	58.3
	2006-07		11	72.7
	2005-06		7	71.4
Statistics	2009-10	Non-Disadvantaged	116	64.7
	2008-09		91	62.6
	2006-07		86	64.0
	2005-06		71	56.3
	2009-10	Disadvantaged	17	29.4
	2008-09		7	14.3
	2006-07		12	16.7
	2005-06		4	25.0

Math IB Test Pass Rates, Overall

Test	School Year	No. Tested	% Passing
IB Math Studies	2009-10	36	97%
	2008-09	33	97%
	2007-08	27	93%
	2006-07	52	94%
	2005-06	31	94%
	2004-05	48	96%
IB Mathematics	2009-10	52	90%
	2008-09	47	77%
	2007-08	36	61%
	2006-07	32	88%
	2005-06	25	100%
	2004-05	31	94%

Math IB Test Pass Rates, by Race

Test	Race	School Year	No. Tested	% Passing
IB Math Studies	Asian	2009-10	4	100%
		2008-09	5	100%
		2006-07	6	100%
		2005-06	6	83%
		2004-05	5	100%
	Black	2009-10	5	100%
		2008-09	3	67%
		2006-07	1	100%
		2005-06	3	67%
		2004-05	4	100%
	Hispanic	2009-10	5	80%
		2008-09	6	100%
		2006-07	8	75%
		2005-06	3	100%
		2004-05	6	83%
	White	2009-10	22	100%
		2008-09	19	100%
		2006-07	37	97%
		2005-06	19	100%
		2004-05	33	97%
IB Mathematics	Asian	2009-10	7	86%
		2008-09	2	100%
		2006-07	3	67%
		2005-06	6	100%
		2004-05	4	100%
	Black	2009-10	1	100%
		2008-09	2	100%
		2006-07	2	100%
		2005-06	3	100%
		2004-05	0	n/a
	Hispanic	2009-10	6	83%
		2008-09	5	80%
		2006-07	2	100%
		2005-06	1	100%
		2004-05	0	n/a
	White	2009-10	37	92%
		2008-09	36	75%
		2006-07	25	88%
		2005-06	15	100%
		2004-05	27	93%
	Other	2009-10	1	100%
		2008-09	2	50%
		2006-07	0	n/a
		2005-06	0	n/a
		2004-05	0	n/a

Math IB Test Pass Rates, by Gender

Test	Gender	School Year	No. Tested	% Passing
IB Math Studies	Female	2009-10	19	95%
		2008-09	26	96%
		2006-07	36	97%
		2005-06	26	96%
		2004-05	31	97%
	Male	2009-10	17	100%
		2008-09	7	100%
		2006-07	16	88%
		2005-06	5	80%
		2004-05	17	94%
IB Mathematics	Female	2009-10	22	91%
		2008-09	24	83%
		2006-07	20	85%
		2005-06	12	100%
		2004-05	23	96%
	Male	2009-10	30	90%
		2008-09	23	70%
		2006-07	12	92%
		2005-06	13	100%
		2004-05	8	88%

Math IB Test Pass Rates, by Economic Status

Test	Economic Status	School Year	No. Tested	% Passing
IB Math Studies	Non-Disadvantaged	2009-10	31	100%
		2008-09	26	96%
		2006-07	49	94%
		2005-06	26	96%
		2004-05	45	98%
	Disadvantaged	2009-10	5	80%
		2008-09	7	100%
		2006-07	3	100%
		2005-06	5	80%
		2004-05	3	67%
IB Mathematics	Non-Disadvantaged	2009-10	48	90%
		2008-09	46	76%
		2006-07	29	86%
		2005-06	23	100%
		2004-05	29	97%
	Disadvantaged	2009-10	4	100%
		2008-09	1	100%
		2006-07	3	100%
		2005-06	2	100%
		2004-05	2	50%

Math IB Test Pass Rates, by LEP Status

Test	LEP Status	School Year	No. Tested	% Passing
IB Math Studies	Non-LEP	2009-10	35	97%
		2008-09	30	97%
		2006-07	51	96%
		2005-06	30	93%
		2004-05	47	98%
	LEP	2009-10	1	100%
		2008-09	3	100%
		2006-07	1	0%
		2005-06	1	100%
		2004-05	1	0%
IB Mathematics	Non-LEP	2009-10	51	90%
		2008-09	47	77%
		2006-07	32	88%
		2005-06	25	100%
		2004-05	31	94%
	LEP	2009-10	1	100%
		2008-09	0	n/a
		2006-07	0	n/a
		2005-06	0	n/a
		2004-05	0	n/a

Math IB Test Pass Rates, by Disability Status

Test	Disability Status	School Year	No. Tested	No. Passing	% Passing
IB Math Studies	Non-Disabled	2009-10	33	33	100%
		2008-09	33	32	97%
		2006-07	52	49	94%
		2005-06	31	29	94%
		2004-05	47	45	96%
	Disabled	2009-10	3	2	67%
		2008-09	0	0	n/a
		2006-07	0	0	n/a
		2005-06	0	0	n/a
		2004-05	1	1	100%
IB Mathematics	Non-Disabled	2009-10	52	47	90%
		2008-09	47	36	77%
		2006-07	31	27	87%
		2005-06	25	25	100%
		2004-05	30	28	93%
	Disabled	2009-10	0	0	n/a
		2008-09	0	0	n/a
		2006-07	1	1	100%
		2005-06	0	0	n/a
		2004-05	1	1	100%

HANOVER RESEARCH

1101 Connecticut Ave. NW, Suite 300, Washington, DC 20036
P 202.756.2971 F 866.808.6585 www.hanoverresearch.com

Longitudinal Math Data Analysis

Prepared for Arlington Public Schools

The following report summarizes math performance trends of Arlington Public Schools (APS) students. We analyze course level data and examination scores to determine patterns in math achievement. We segment the analysis by various demographic groups including race, gender and economically disadvantaged status to estimate potential gaps between groups. We conclude by examining the relationship between course level and academic performance.

Table of Contents

Executive Summary

The primary goal of this report is to provide Arlington Public Schools with a longitudinal analysis of its students' math performance. We evaluate two measures of performance: math course level and academic test scores. The data, which span from the 2003 to 2009 school year, are supplied by APS. The data coverage is for 817 students who enrolled in the school district from the third grade to ninth grade.

The math course level measure is broken down into four main groups: accelerated, grade-level, remedial, and self-contained. Course level data are available for both summer and regular school year. We analyze the data to identify course level trends over time.

Student test scores originate from two types of tests: (1) the Virginia Department of Education's Standards of Learning (SOL) Test and (2) Pearson Education's Stanford 10 Achievement Test. With the exception of grade four, data are available for grades three through nine for the SOL test. In contrast, data for the Stanford 10 test are only available for grades four and six.

The dataset provided also includes students' demographic data. Demographic information includes race, gender, LEP (Limited English Proficiency) status, economically disadvantaged status, and SPED (Special Education) status. Additionally, we were also given data on student attendance from the 2003 to 2009 school year. We segment both math achievement and course level analyses using these demographic data/attendance records. The overarching objective is to determine whether there are differences within and between these groups of students.

The report is divided into four sections. In *Demographic Information* we briefly summarize the demographic data of our analysis group. In *Enrollment Patterns* we display the results of our course level analysis from 2003 to 2009. In *Achievement Trends* we provide findings from our analysis of the SOL and Stanford 10 examination results. *Enrollment Patterns* and *Achievement Trends* both include a subsection on group segmentation analysis. In *Relationship between Enrollment and Achievement* we exhibit findings from correlation and regression analyses between enrollment and achievement indicators. We answer specific relational questions posed by APS.

Key Findings

Enrollment Patterns

- There were a higher percentage of students enrolled in accelerated math programs in the eighth grade compared to other grades.
- Overall, students regressed into grade-level programs in the ninth grade (i.e., there were a higher percentage of students enrolled in grade-level programs in the ninth grade).
- White students were more likely to enroll in accelerated math programs compared to the rest of the group of students. On average, close to two-thirds of white students took accelerated programs.
- SPED students were the least likely group to enroll in an accelerated program (12 percent).
- The proportion of black students in remedial/self-contained courses nearly doubled from 17 percent in the sixth grade to 32 percent in the eighth grade.
- Male and female students were close enough in their course enrollment patterns that their differences were not statistically observable.

Achievement Trends

- Students recorded the highest average score in the third grade math SOL (520.7 average) and the lowest score in the sixth grade math SOL (403.4 average).
- The reason for the low average score in the sixth grade SOL is due to the fact that (a) well performing sixth graders had enrolled in accelerated courses, and (b) these students' test scores are factored into the seventh or eighth grade SOL test scores.
- Stanford test takers in the sixth grade performed better than fourth grade test takers (68.6 average vs. 61.5 average).
- Those who are white, male, Asian and/or have above average attendance tend to score higher than other students on the SOL test.
- Students who are female, Hispanic, black, and/or have LEP, SPED, and economically disadvantaged designations performed below average on the SOL test. Those with below average attendance also did poorly on the SOL test.
- Group trends on the Stanford 10 test are similar to the group trends on the SOL test.

- In regard to SOL scores, there is a general downward trajectory for every student group from the third grade to the sixth grade. From the sixth grade onwards, there was a general upward movement in SOL scaled scores.
- In general, there appears to be a convergence between student SOL test scores as students approached the ninth grade. In essence, the difference in test scores between groups became smaller after the sixth grade.

Relationship between Enrollment and Achievement

- We determined that there is a moderate and positive correlation between test scores and math course level.
- Fifth grade Pass Advanced students performed significantly better (on the eighth grade SOL and Algebra I SOL) than Pass Proficient students, who in turn performed significantly better than Fail status students.
- While we were unable to find a strong relationship between attendance and test scores, we were able to determine that those who had above average attendance tended to perform better than those who had below average attendance.
- There is hardly any association between days of attendance in one school year and the corresponding course enrollment level in the following school year.
- From a regression analysis, we determined that all but two indicators included in the model influence a student's SOL test score. The two indicators that are not found to be statistically significant, when controlling for other factors, are gender and economically disadvantaged status. By contrast, factors such as race, LEP and SPED status, attendance, summer course enrollment, and level of course taken influence a student's SOL test score in a statistically significant way.

Demographic Information

Of the 817 students for whom we have data, slightly more than half were identified as white (Figure 1). Because of the low number of American Indian students and students with unspecified race, we exclude these students from the remaining analysis. There were slightly more female than male students in the dataset (Figure 2).

Figure 1: Race

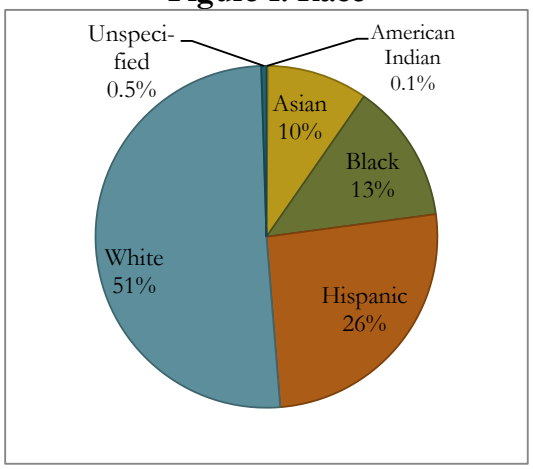
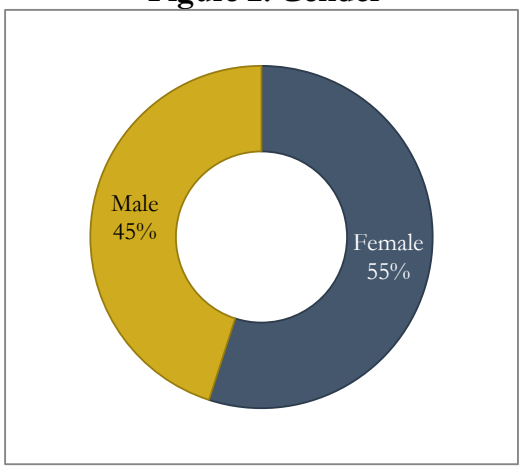
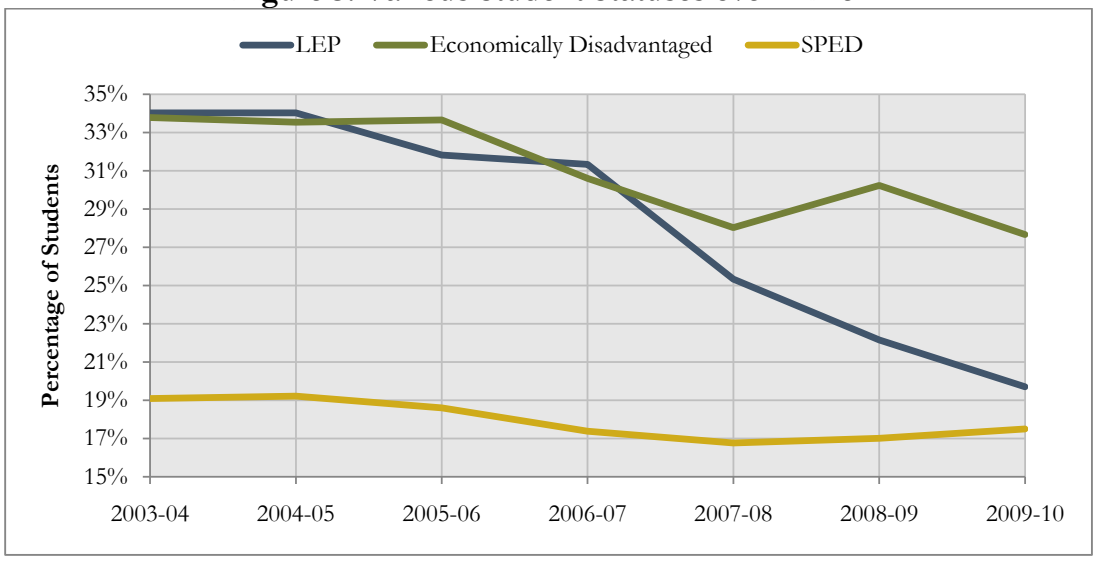


Figure 2: Gender



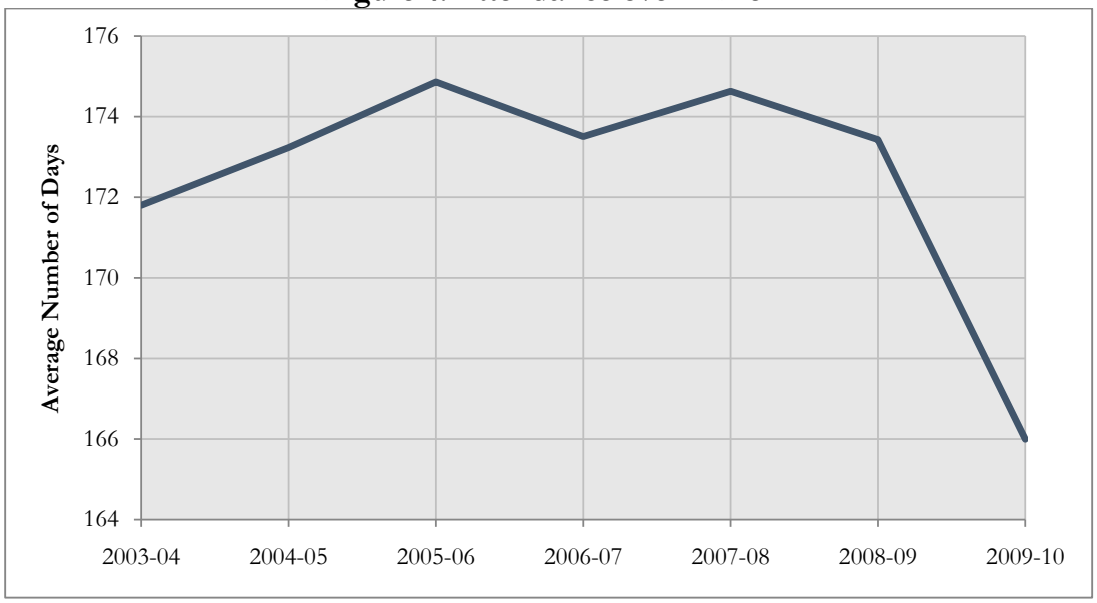
The **proportion of LEP (Limited English Proficiency) students fell** from 34 percent in 2003 to 20 percent in 2009. Similarly, the **number of students that were economically disadvantaged also fell** in the same time period (34 percent in 2003 vs. 28 percent in 2009). The percentage of students with SPED designation remained relatively unchanged over time.

Figure 3: Various Student Statuses over Time



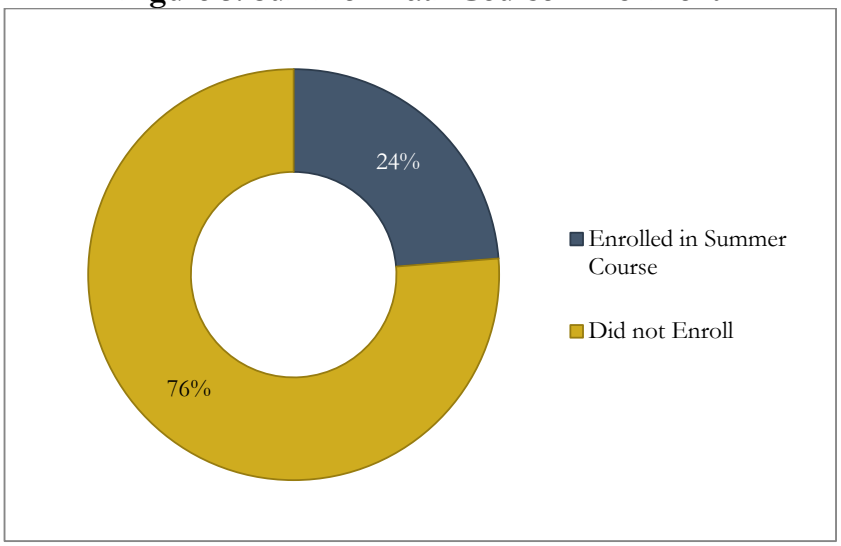
Overall, student attendance fluctuated mildly between 2003 and 2008. Students averaged 173.6 days of attendance during this time period. By contrast, attendance dropped dramatically to 166 days per student in the 2009 academic year.

Figure 4: Attendance over Time



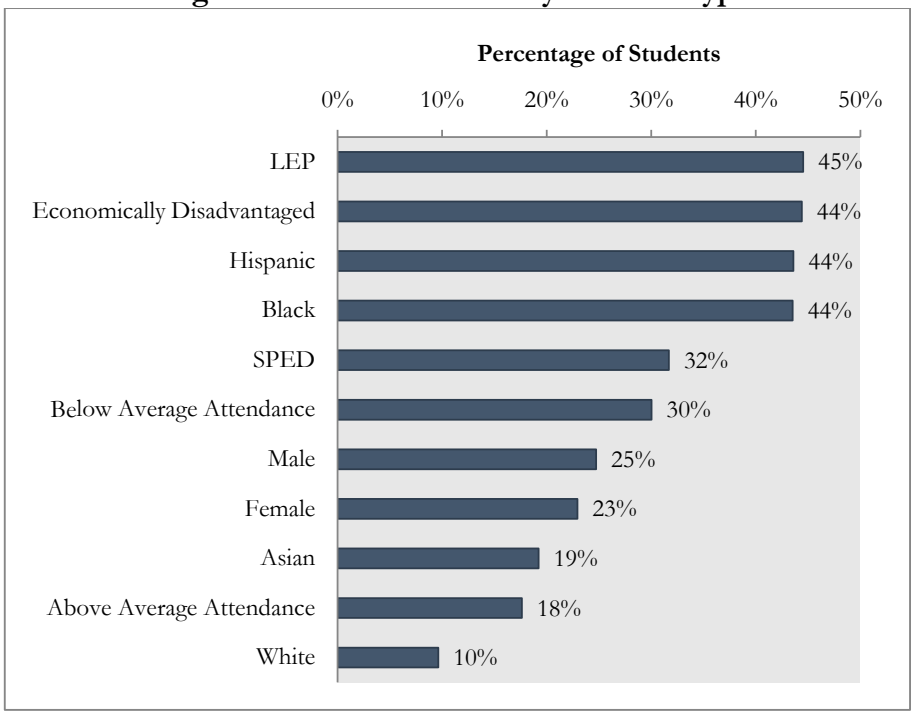
When it comes to summer enrollment, around a quarter of students have enrolled in at least one summer math course between 2006 and 2009. Note that summer session data are only available beginning in 2006.

Figure 5: Summer Math Course Enrollment



Approximately **45 percent of LEP students enrolled in at least one summer math course** between 2006 and 2009. Other student groups with high propensity for summer enrollment include economically disadvantaged, Hispanic and black students (44 percent each). White students are the least likely of any student group to enroll to in summer courses: Only 10 percent of all white students have taken any math courses in the summer.

Figure 6: Summer Course by Student Type



Enrollment Patterns

In this section we examine trends in students' math course level (i.e., course category) over time. Course level is measured by four main categories: accelerated, grade-level, remedial, and self-contained. Data for course level are only available from 2006 to 2009.

Overall Enrollment

The number of students who took math courses declined, to some extent, from 805 in 2006 to 789 in 2009 (Figure 7). In regard to summer session, the number of math students declined considerably in 2009 (28 total enrollment) only to increase again in 2010 (85) (Figure 8).

Figure 7: Overall Number of Enrollment – School Year

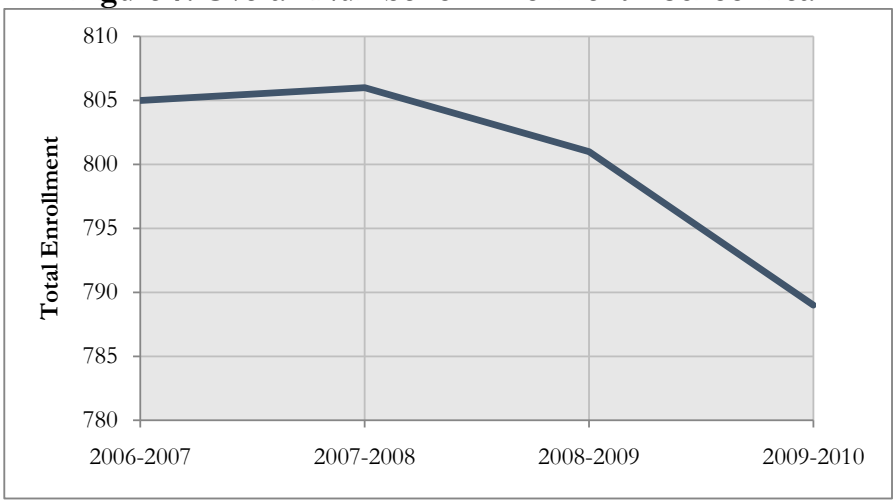
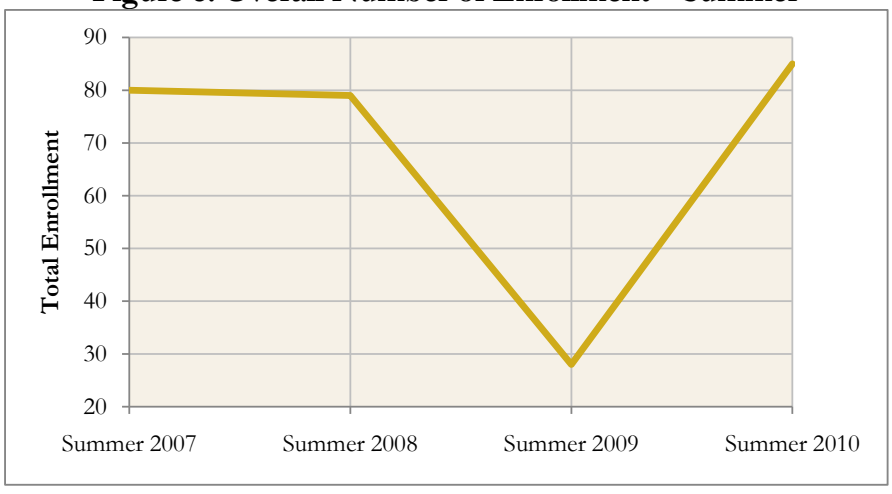


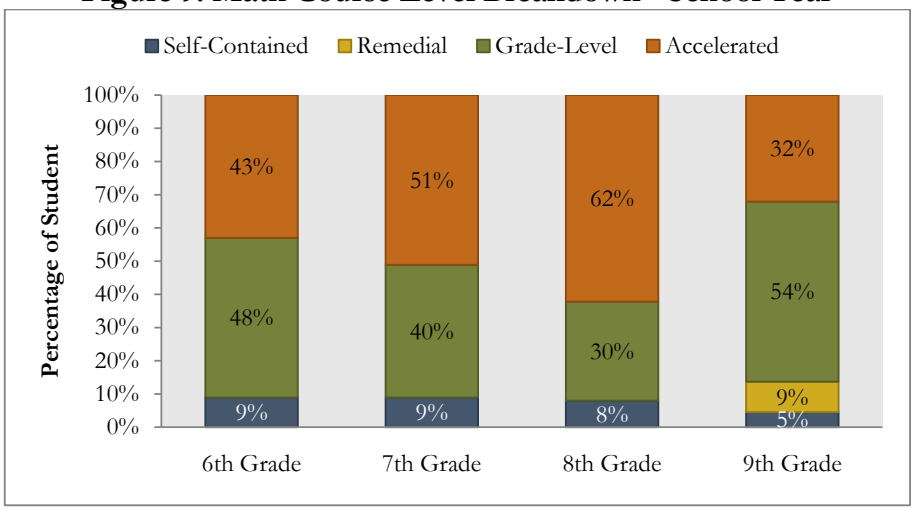
Figure 8: Overall Number of Enrollment – Summer



The following graphs present course category breakdowns by grade-level. To reiterate, sixth grade corresponds to 2006-07 enrollment, seventh grade to 2007-08 enrollment, etc.

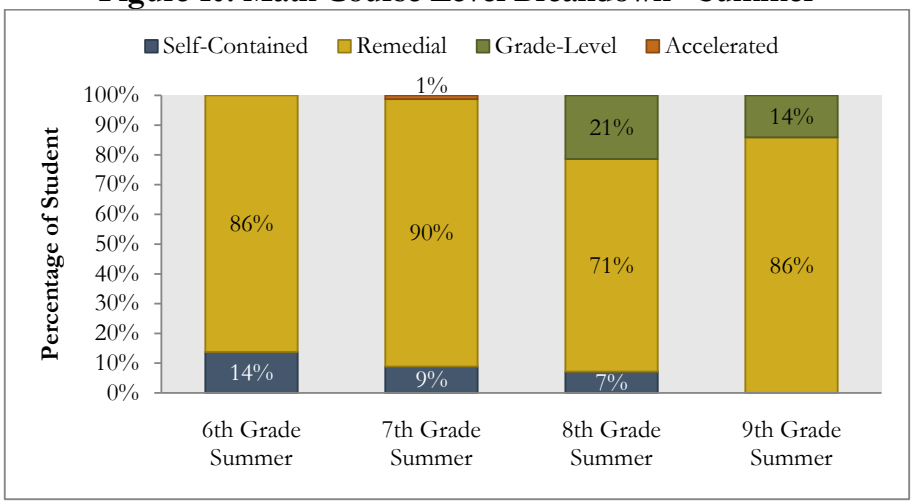
In the regular school year, there **were more students in accelerated math programs in the eighth grade compared to other grades**. However, students **regressed into grade-level programs in the ninth grade** (i.e., there was a higher percentage of students enrolled in grade-level programs in ninth grade). Additionally, the only instance in which remedial programs appeared in the regular school year is during the ninth grade (2009-10).

Figure 9: Math Course Level Breakdown - School Year



In contrast to the regular school year, **most summer courses consist of remedial type programs**. There does not appear to be much change in the composition of summer courses over the measured timeframe.

Figure 10: Math Course Level Breakdown - Summer



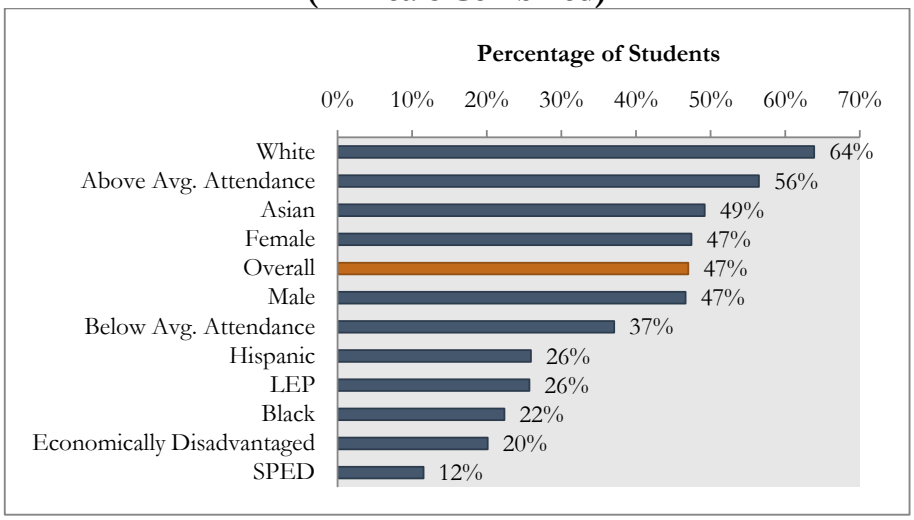
Enrollment Patterns by Student Type

We segmented the course level analysis into various student groups. We analyzed remedial and self-contained programs jointly since both programs had few enrollees. All four years of available data (2006 to 2009) were then combined to formulate the first three graphs. We then illustrate course level change by group, longitudinally. We provide an overall average measure to get a general idea of which group is performing well and which group is underperforming. We did not include, in our analysis, separate categories for students who are non-LEP, non-SPED, and not economically disadvantaged. In other words, in the figures below, we display a separate "LEP" category but do not display a separate "non-LEP" category. The comparison for these students is included in the appendix.

We could not provide the same types of graphs for summer courses as there are too few variations in the course level offered (i.e., most courses are remedial in nature). However, based on two of the graphs above (Figure 6 and Figure 10) we could infer that **LEP, economically disadvantaged, Hispanic and black students need more remedial help in the summer** than any other group of students. While Figure 6 shows that these students have a high likelihood of enrolling in a summer course, Figure 10 shows that most summer courses are remedial in nature.

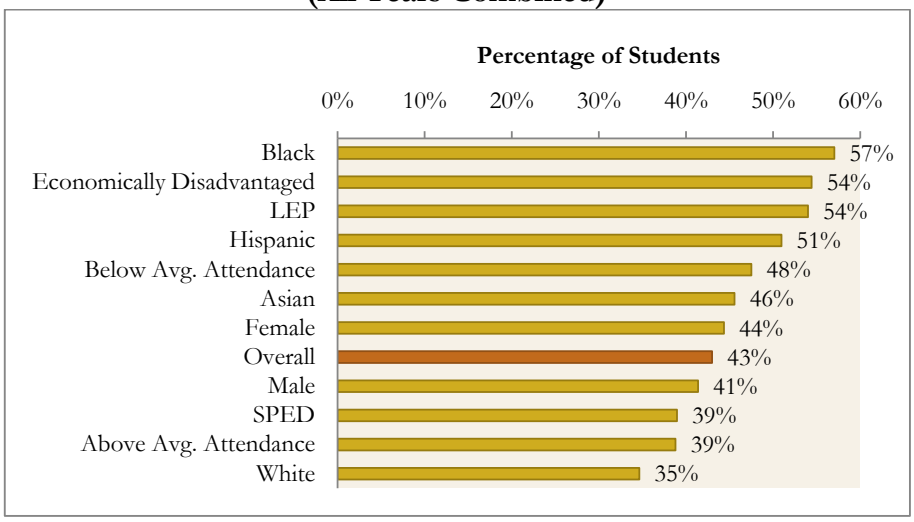
In regard to course level in the regular school year, **white students were more likely to enroll in accelerated programs** compared to the rest of the segmented group of students. On average, close to two-thirds of white students took accelerated programs. Male and female students were equally as likely to enroll in accelerated courses (47 percent each). **SPED students were the least likely** group to enroll in an accelerated program (12 percent).

Figure 11: Accelerated Program Enrollment by Type of Student (All Years Combined)



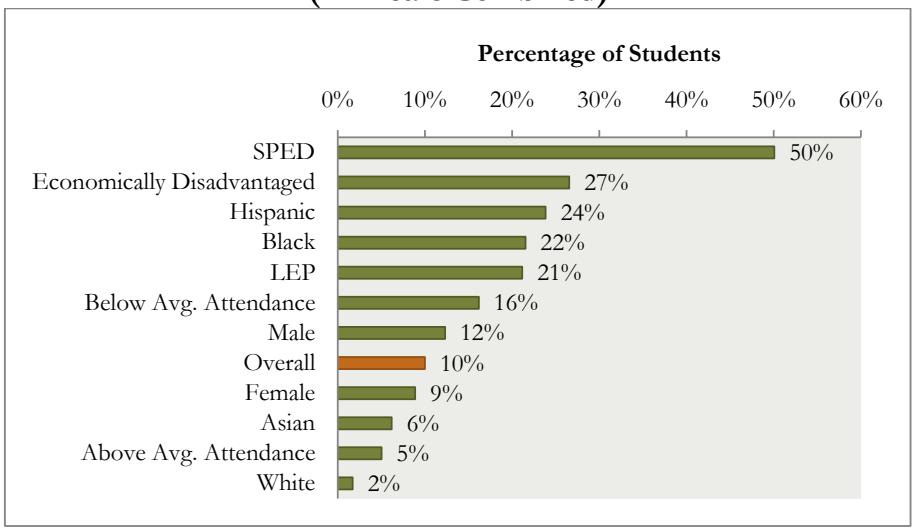
Black students were not well represented in accelerated math programs at APS. Only 22 percent of black students enrolled in advanced math programs between 2006 and 2009. **Black students were more likely to enroll in grade-level programs** (57 percent) (Figure 12, below). White students were the least likely of any of the observed groups to enroll in grade-level programs.

Figure 12: Grade-Level Program Enrollment by Type of Student (All Years Combined)



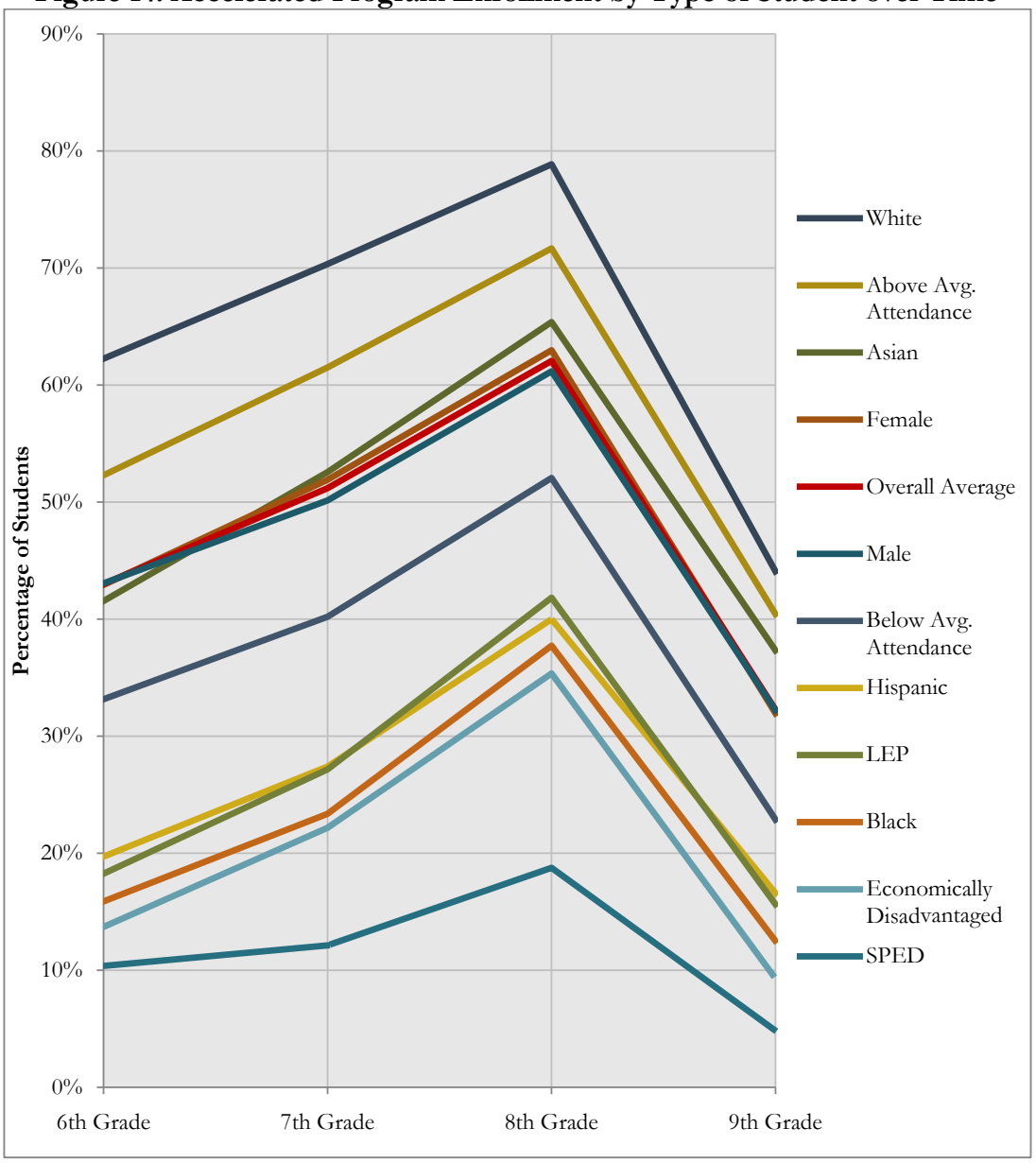
Overall, **approximately half of SPED students enrolled in remedial and self-contained programs**. Consistent with our findings – that white students tend to enroll in more advanced math courses – only two percent of white students enrolled in remedial/self-contained programs.

Figure 13: Remedial/Self Contained Program Enrollment by Type of Student (All Years Combined)



The next three graphs present course level findings by group over time. In general, there was a **spike in accelerated course enrollment** for every student group in the **eighth grade**. The proportion of accelerated students in the ninth grade is lower than any of the other grade levels, for all of the identified groups.

Figure 14: Accelerated Program Enrollment by Type of Student over Time

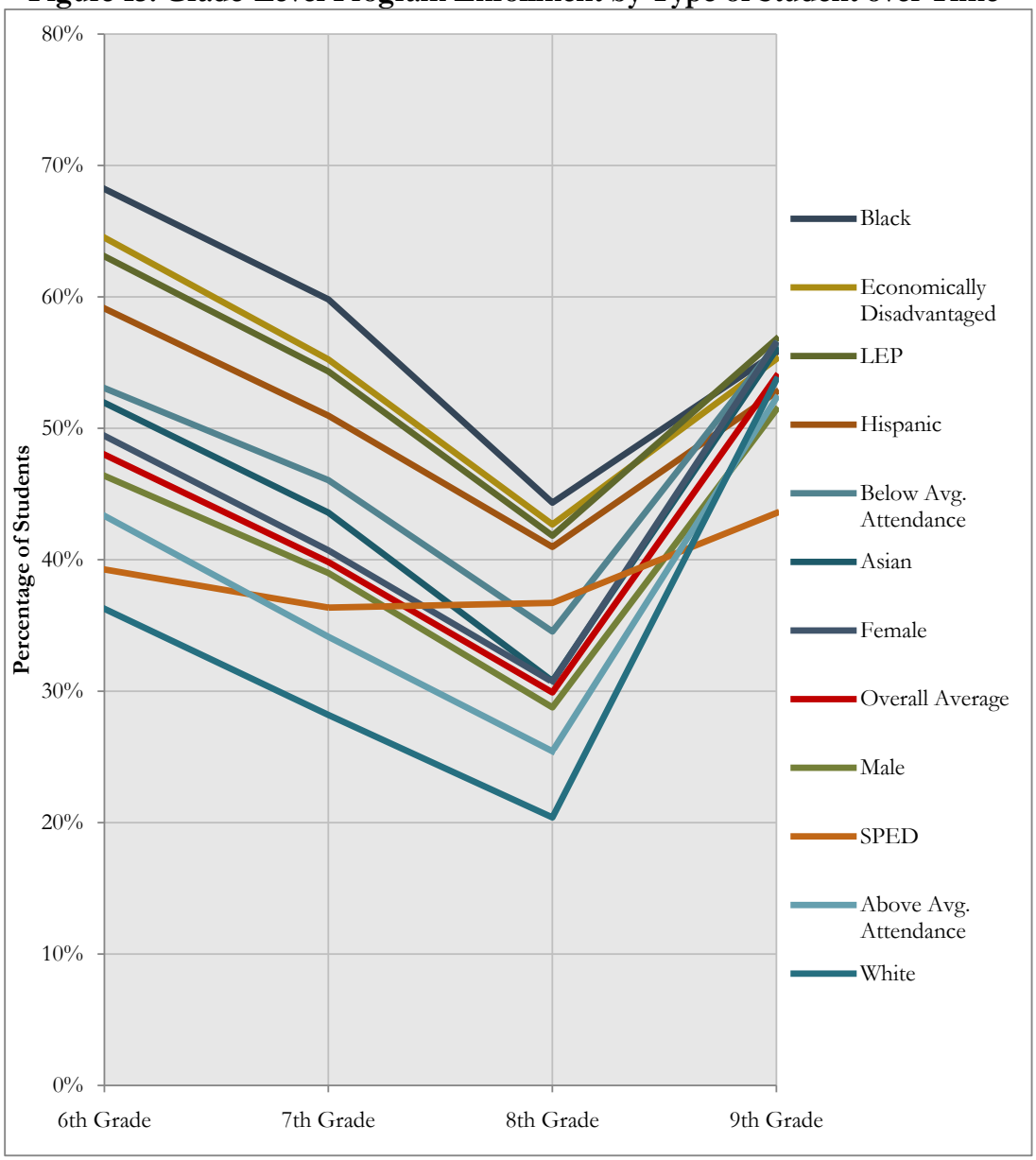


It is worth noting that **the year-to-year change does not impact the relative position of many of these groups**. For example, despite the increase in accelerated program enrollment in the eighth grade and the subsequent dip in ninth grade, white students remained the highest group to enroll in accelerated programs.

A similar pattern can be seen in grade-level enrollment over time (we ordered the graph legend to correspond to each group's placement relative to each other). Black students continued to be the most represented group in this course category from sixth to ninth grade. **In the eighth grade, there was a decline in grade-level**

enrollment for almost all of the observed groups, to counterbalance the increase in accelerated course enrollment. SPED students appear to buck this enrollment pattern, wherein the group's enrollment in grade-level courses remained steady over time. The proportion of students in grade level course appears to be similar across groups in the ninth grade.

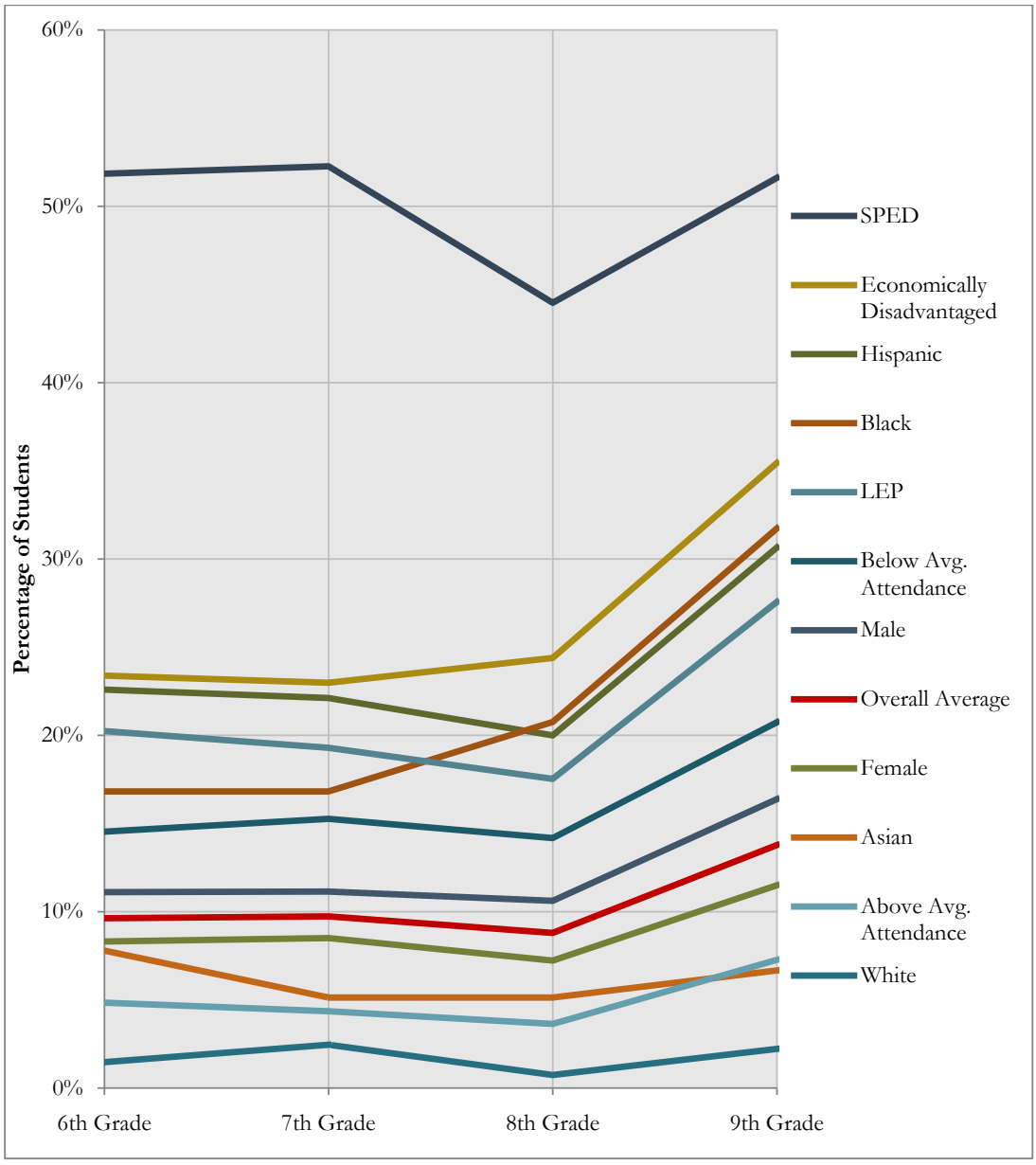
Figure 15: Grade-Level Program Enrollment by Type of Student over Time



When we examined remedial/self-contained course enrollment over time, we noticed that the **proportion of black students nearly doubled** from 17 percent in the sixth grade to 32 percent in the ninth grade. This is most likely due to the fact that remedial

courses were introduced in the regular school year in the ninth grade, and that **black, Hispanic, LEP and economically disadvantaged students tend to enroll in remedial courses at higher rates** than other groups. The same four groups that had above average representation in accelerated program enrollment were below average in remedial and self contained program enrollment (white, above average attendance, Asian and female students).

Figure 16: Remedial/Self- Contained Program Enrollment by Type of Student over Time



While the graphs above exemplify differences *between* groups, the following table illustrates the differences *within* student groups (e.g., LEP vs. Non LEP students). Specifically, the table below provides the results of statistical testing to determine whether or not the difference within each demographic group is meaningful. Asterisks represent statistically significant findings (at p-value<0.01. Another way to interpret this is that we are 99 percent confident that the difference within groups marked with asterisks in course level enrollment is statistically significant).

In regard to regular school year enrollment, we witnessed **significant differences in the enrollment patterns within almost every group**. The one exception is between genders. Male and female students were close enough in their course enrollment patterns, that their differences were not statistically observable. In the summer, it appears that the difference in students' course level is negligible. The only statistically significant difference, in the summer, is between SPED and non-SPED students in the sixth and ninth grade.

See the appendix to visualize the actual course level difference between students who were designated LEP, SPED and economically disadvantaged and students who were not.

Table 1: Differences in Course Category within Group

Category	Race	LEP	SPED	Gender	Econ. Status	Atten-dance
Group Differences in Course Category – School Year						
6th Grade Course Category	***	***	***		***	***
7th Grade Course Category	***	***	***		***	***
8th Grade Course Category	***	***	***		***	***
9th Grade Course Category	***	***	***		***	***
Group Differences in Course Category – Summer						
6th Grade Summer Course Category			***			
7th Grade Summer Course Category						
8th Grade Summer Course Category			***			
9th Grade Summer Course Category						

*** Differences statistically significant at p-value<0.01

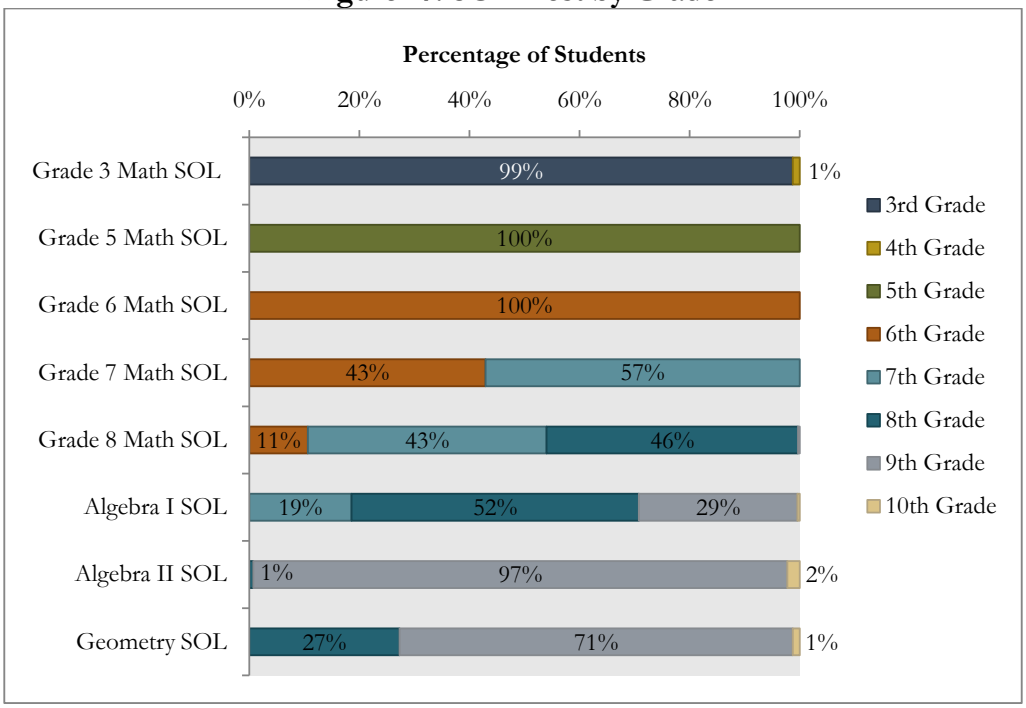
Achievement Trends

In this section we examine overall test score achievements as well as summarize test score gaps between identified groups and within these groups. The test scores are based on two exams: the Standards of Learning (SOL) test which is administered each year (*with the exception of fourth grade*), and the Stanford 10 test which is administered in grades four and six. We were given two measures of the SOL: performance level (a 1-5 rank) and scaled score (a score ranging from 193 to 600). We utilized the scaled score in our analysis as this measure has more variation.

Overall Achievement

To clarify, students are able to enroll in accelerated math courses beginning in grade six. Students in accelerated math programs take the SOL test that corresponds to their course level (e.g., an accelerated sixth grader would take the seventh grade SOL test). The figure below presents the distribution of SOL tests by grade level. As we can see, 43 percent of those who took the seventh grade SOL test were from the sixth grade, while the remaining 57 percent were from the seventh grade.

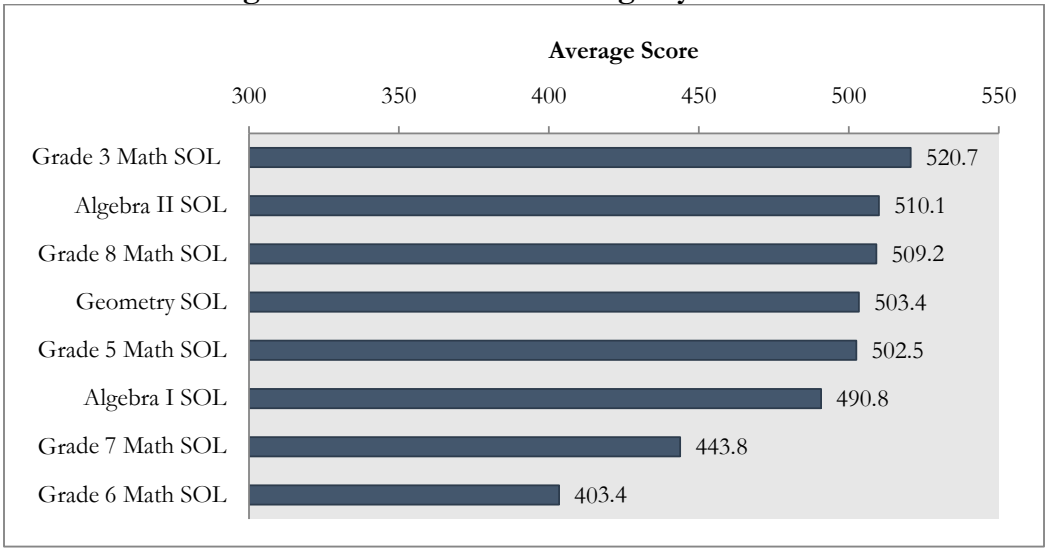
Figure 17: SOL Test by Grade



APS has requested that we examine achievement scores by grade level (e.g., how did sixth grade students perform on the SOL test, regardless of which SOL test they took). We therefore focus much of the discussion of our findings by grade-level.

Figure 18 displays the average SOL test score by test type. Students recorded the **highest average score in the third grade math SOL (520.7 average) and the lowest score in the sixth grade math SOL (403.4 average)**.

Figure 18: Scaled Score Average by SOL Test



The reason for the low average score in the sixth grade SOL is due to the fact that (a) high performing sixth graders had enrolled in accelerated courses, and (b) these students' test scores are factored into the seventh or eighth grade SOL test scores. Sixth graders who took accelerated courses scored 97 points higher than their peers, while sixth graders who took accelerated courses scored 174 points higher than their peers.

We highlight in yellow the grade with the highest score for each test. In every case, **students who are in accelerated programs performed better** than the rest.

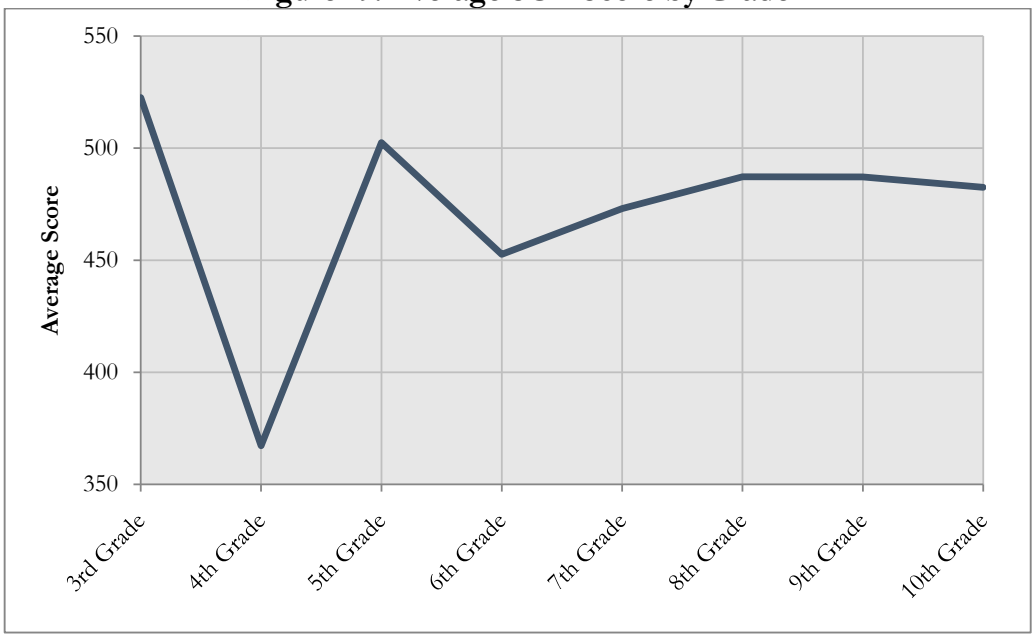
Table 2: Average SOL Score by Grade and by Test

	6th Grade	7th Grade	8th Grade	9th Grade	10th Grade	Overall
Grade 6 SOL	403					403
Grade 7 SOL	500	402	-	-	-	444
Grade 8 SOL	575	545	461	326	-	509
Algebra I SOL	-	527	492	464	516	491
Algebra II SOL	-	-	600	510	479	510
Geometry SOL	-	-	532	493	468	503

When we looked at scores by grade (regardless of the SOL year) we found that fourth grade students performed the worst on the SOL (367 average), while third grade students performed the best (522 average). The reason fourth grade students performed significantly worse than others is because these (nine) students took the

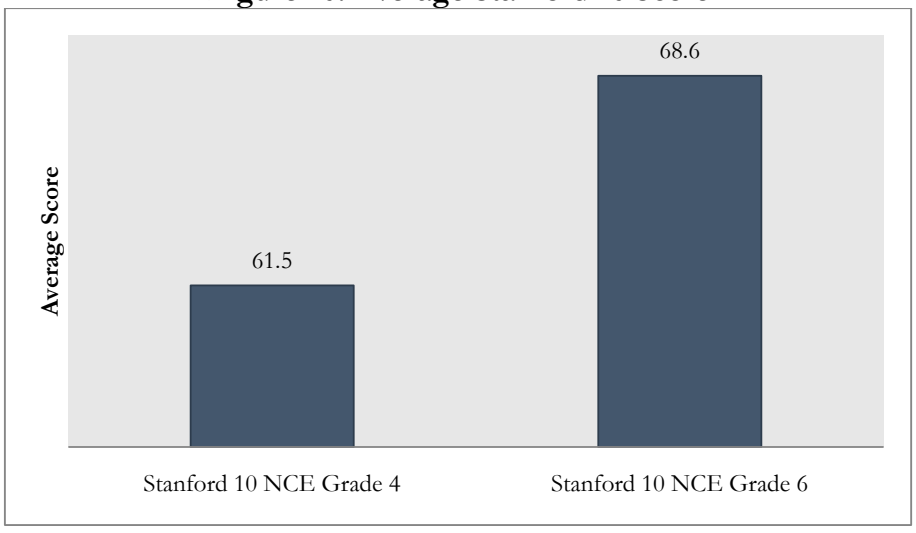
third grade SOL test, suggesting that they were lagging behind other students in the fourth grade. For secondary school grade-level, those in the eighth grade performed the best in the SOL test (487), by a small margin.

Figure 19: Average SOL Score by Grade



The figure below details average perfomance on the Stanford 10 test. Stanford test takers in the **sixth grade performed better than fourth grade test takers** (68.6 average vs. 61.5 average).

Figure 20: Average Stanford 10 Score

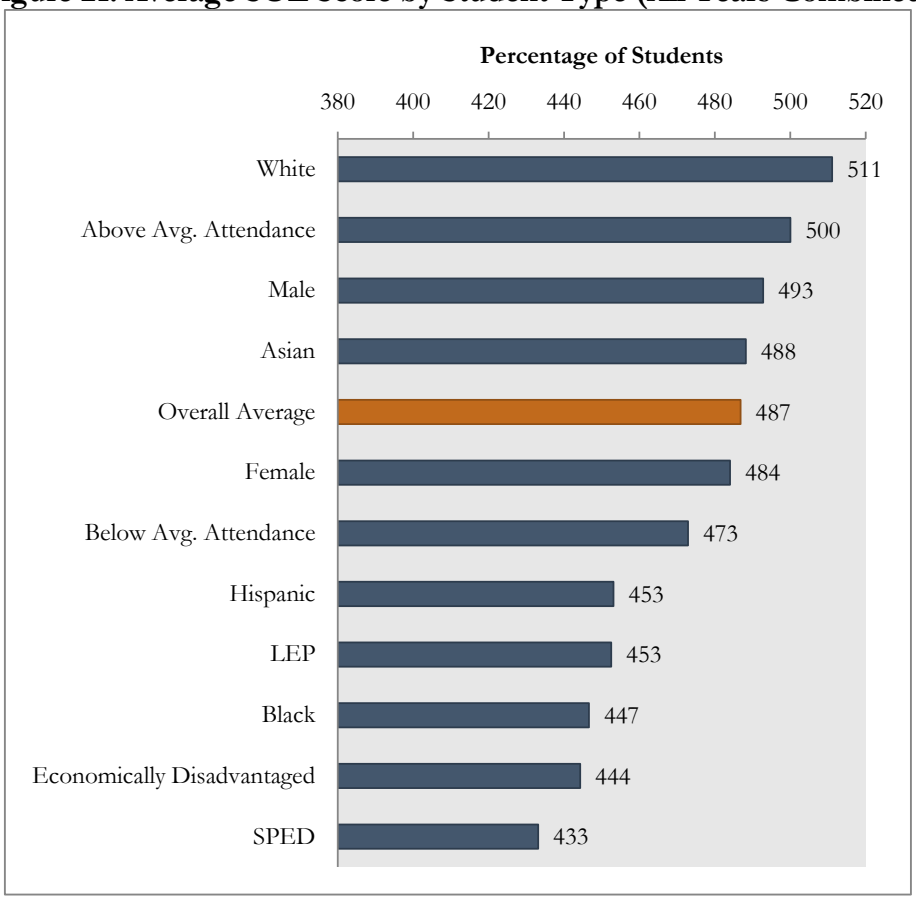


Achievement Trends by Student Type

In this subsection we segment the achievement findings above by student type. As with our analysis of enrollment patterns, we did not include separate categories for students who are non-LEP, non-SPED, and not economically disadvantaged. The comparison for these students is included in the appendix.

Those who are **white, male, Asian and/or have above average attendance tend to score higher** than the rest on the SOL test. Student groups that placed high on the SOL test measure also placed high on the accelerated course level measure (i.e., white students finishing at the top on both measures, students with above average attendance finishing second, etc.) (see Figure 11, above). Students who are female, Hispanic, black, and/or have LEP, SPED, and economically disadvantaged designations performed below average on the SOL test. Those with below average attendance also did poorly on the SOL test.

Figure 21: Average SOL Score by Student Type (All Years Combined)

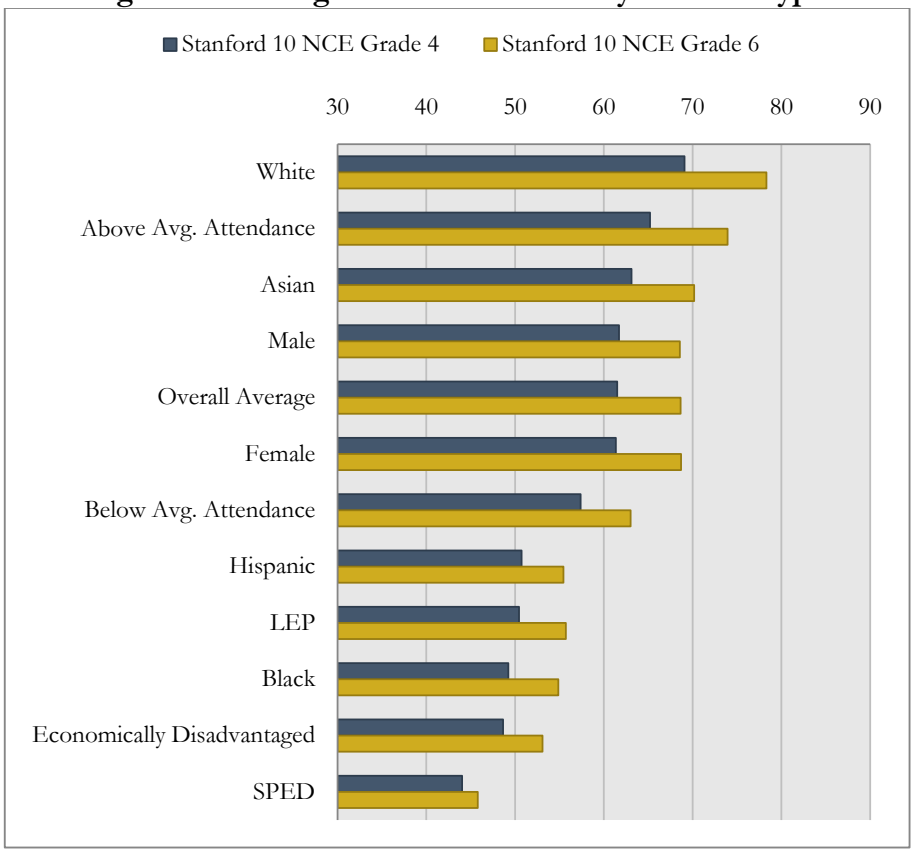


One interesting finding is that while **females performed marginally better than males on the course level measure** – i.e., more female students enrolled in

accelerated courses and fewer female students enrolled in remedial/self-contained classes (Figure 11 and 13, above) – **male students tend to do better on the SOL examination measure** (493 average score vs. 484 average score) (Figure 21, above).

The results for the Stanford 10 are presented below in the order of the highest to lowest performing group. Across all groups, students performed better in the sixth grade than in the fourth grade. The order of the groups for the Stanford 10 test is similar to that of the SOL test average.

Figure 22: Average Stanford 10 Score by Student Type



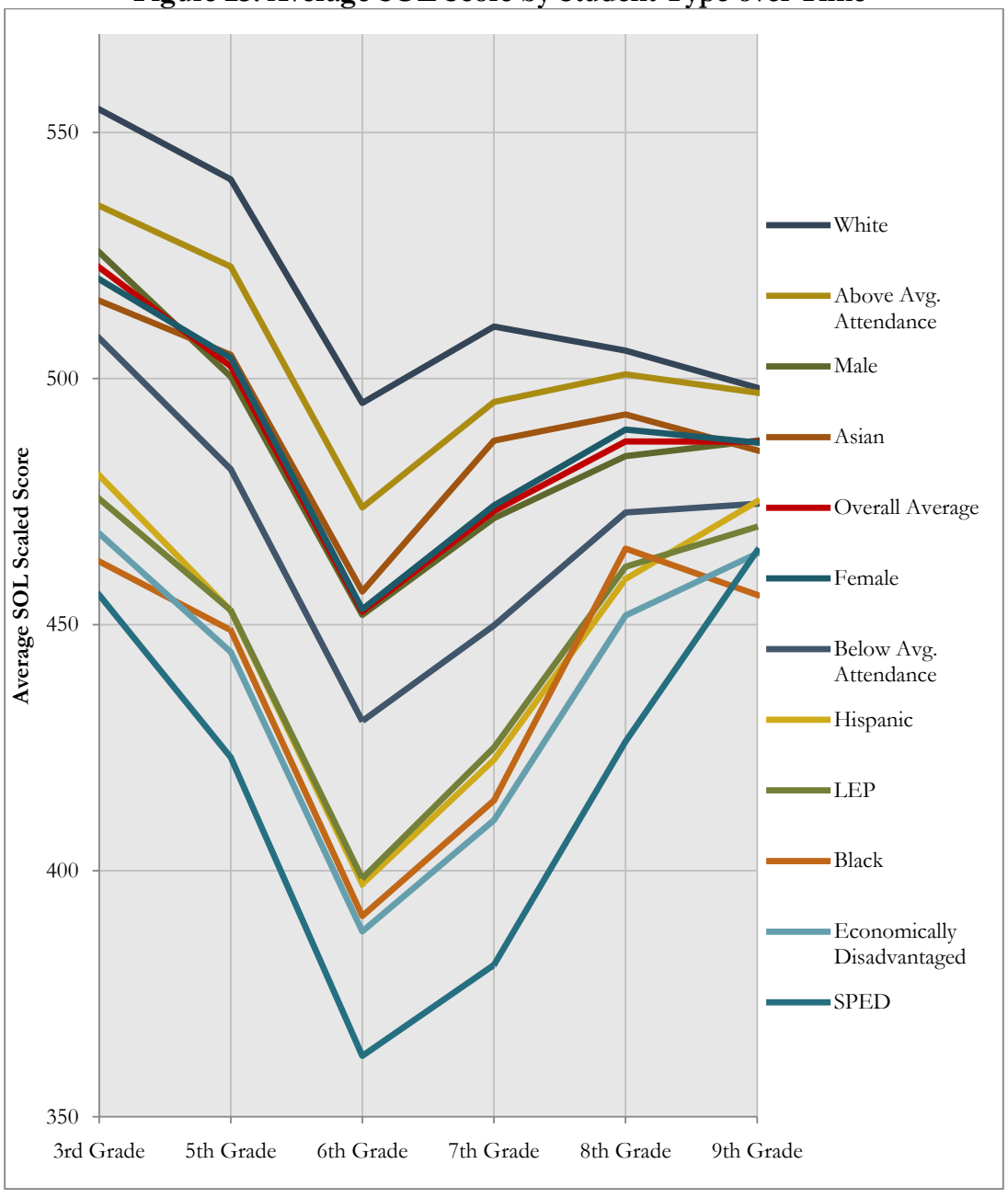
We next examine SOL score averages by student group over time. Because there are a very small number of fourth and tenth grade students (nine and 12 students, respectively), we omit these grade levels from the following analysis. While the following analysis focuses on the differences in test scores between student groups *by grade*, the breakdown of scores by student group *by test type* is presented in the appendix.

In regard to SOL scores, there is a **general downward trajectory for every student group from the third grade to the sixth grade**. From the sixth grade onwards, there was a general upward movement in SOL scaled scores. White students

increased their SOL scores from the sixth grade to the seventh grade, but their scores decreased from the seventh grade to the ninth grade. Even so, white student still top most of the other observed groups in the ninth grade, although by a smaller margin.

In general there appears to be a **convergence between student test scores as students approached the ninth grade.** In essence, the difference in test scores between groups became smaller after the sixth grade.

Figure 23: Average SOL Score by Student Type over Time



We statistically tested for differences in test scores and discovered that within each group, test scores were markedly dissimilar. In other words, we are 99 percent confident that the difference between SOL test scores are different within race (e.g., white students tend to score highest, black students tend to score lowest), within LEP status (LEP status students tend to score lower than non-LEP students), etc.

The only category with similar (i.e., not statistically different) test score measures is gender. The differences in test scores between male and female students – similar to course level trends – were small and not statistically significant. Additionally, Algebra II is the only SOL test on which students scored similarly regardless of race, gender, student status, and attendance level.

See the appendix for actual test score differences between students who were designated LEP, SPED and economically disadvantaged and students who were not.

Table 3: Differences in Test Scores within Group

Category	Race	LEP	SPED	Gender	Econ. Status	Atten-dance
Group Differences in SOL Scaled Scores						
Grade 3 Math SOL	***	***	***		***	***
Grade 5 Math SOL	***	***	***		***	***
Grade 6 Math SOL	***	***	***		***	***
Grade 7 Math SOL	***	***	***		***	***
Grade 8 Math SOL	***	***	***		***	***
Algebra I SOL	***	***	***		***	***
Algebra II SOL						
Geometry SOL	***	***			***	***
Group Differences in Stanford 10 Scores						
Stanford 10 NCE Grade 4	***	***	***		***	***
Stanford 10 NCE Grade 6	***	***	***		***	***
Group Differences in SOL Scaled Scores by Grade						
3rd Grade Scaled Score	***	***	***		***	***
5th Grade Scaled Score	***	***	***		***	***
6th Grade Scaled Score	***	***	***		***	***
7th Grade Scaled Score	***	***	***		***	***
8th Grade Scaled Score	***	***	***		***	***
9th Grade Scaled Score	***	***	***		***	***

Relationship between Enrollment and Achievement

In this section we detail the relationship between course enrollment level and academic achievement. This section is presented in a question and answer format based on specific questions that we received from Arlington Public Schools.

> What is the relationship between elementary test scores (3rd grade SOL, 4th grade Stanford 10, and 5th grade SOL) and secondary enrollment, particularly in 6th and 9th grade?

Correlation between Elementary Test Scores and Secondary Enrollment Level

We conducted a correlation analysis to determine the relationship between elementary test scores and secondary enrollment outcome (See the appendix for details on what a correlation analysis means and how to interpret a correlation table). The grade level in which APS is interested is highlighted in yellow.

From the analysis, we determined that there is a **moderate correlation between test scores and math course level**. The correlation is positive, meaning that as elementary test scores increase, so too does the likelihood of enrolling in a higher level secondary math course. The correlation level (close to 0.6) is about the same for every test score, meaning that past SOL and Stanford 10 scores are both moderately associated with students' future course level.

Table 4: Elementary School Grades and Secondary Course Category

	Grade 3 SOL SS	Grade 4 Stanford 10	Grade 5 SOL SS
Grade 6 Course Category	0.589	0.557	0.594
Grade 7 Course Category	0.570	0.565	0.597
Grade 8 Course Category	0.548	0.509	0.553
Grade 9 Course Category	0.569	0.569	0.569

Correlation Statistically Significant at $p<0.001$

> What is the relationship between elementary test scores and later test scores? Specifically, look at 5th grade SOL passing groups (Pass Advanced, Pass Proficient, Fail) and see how the students in each of those groups did on whichever SOL test they took in 8th grade (8th grade SOL, Algebra I SOL, Algebra II SOL, or Geometry SOL).

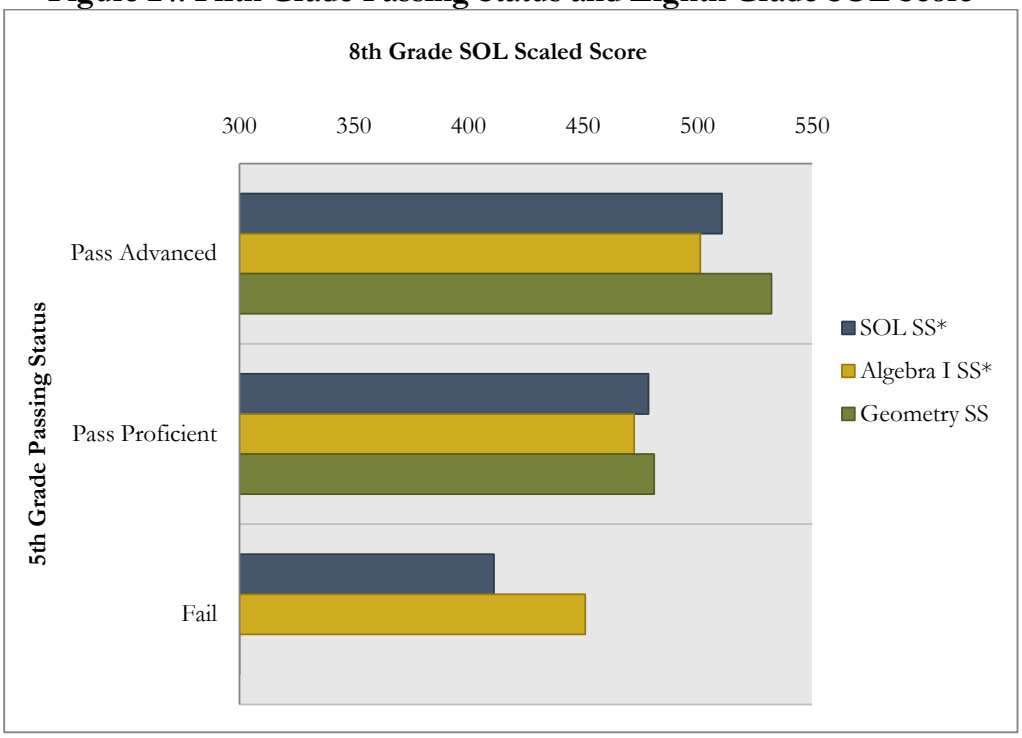
Difference between Fifth Grade Passing Groups in Their Eighth Grade Test Scores

For this question we graphed students' fifth grade passing groups vs. their eighth grade math scaled scores. We excluded Algebra II, since there was only one eighth grade student who took Algebra II. Instead of looking at statistical relationships, we looked at differences in achievement outcomes between Pass Advanced, Pass Proficient and Fail Status fifth graders.

We found the **scores on the eighth grade SOL test and the Algebra I SOL test to be statistically different between the three passing groups**. In other words, Pass Advanced students performed significantly better (on eighth grade SOL and Algebra I SOL) than Pass Proficient students, who in turn performed significantly better than Fail status students.

Though the difference between Pass Advanced and Pass Proficient students appears large for the Geometry scaled score, the difference was not found to be statistically significant. This is because there was only one student who enrolled in Geometry from the fifth grade Pass Proficient group, which led to an unreliable statistical estimate.

Figure 24: Fifth Grade Passing Status and Eighth Grade SOL Score



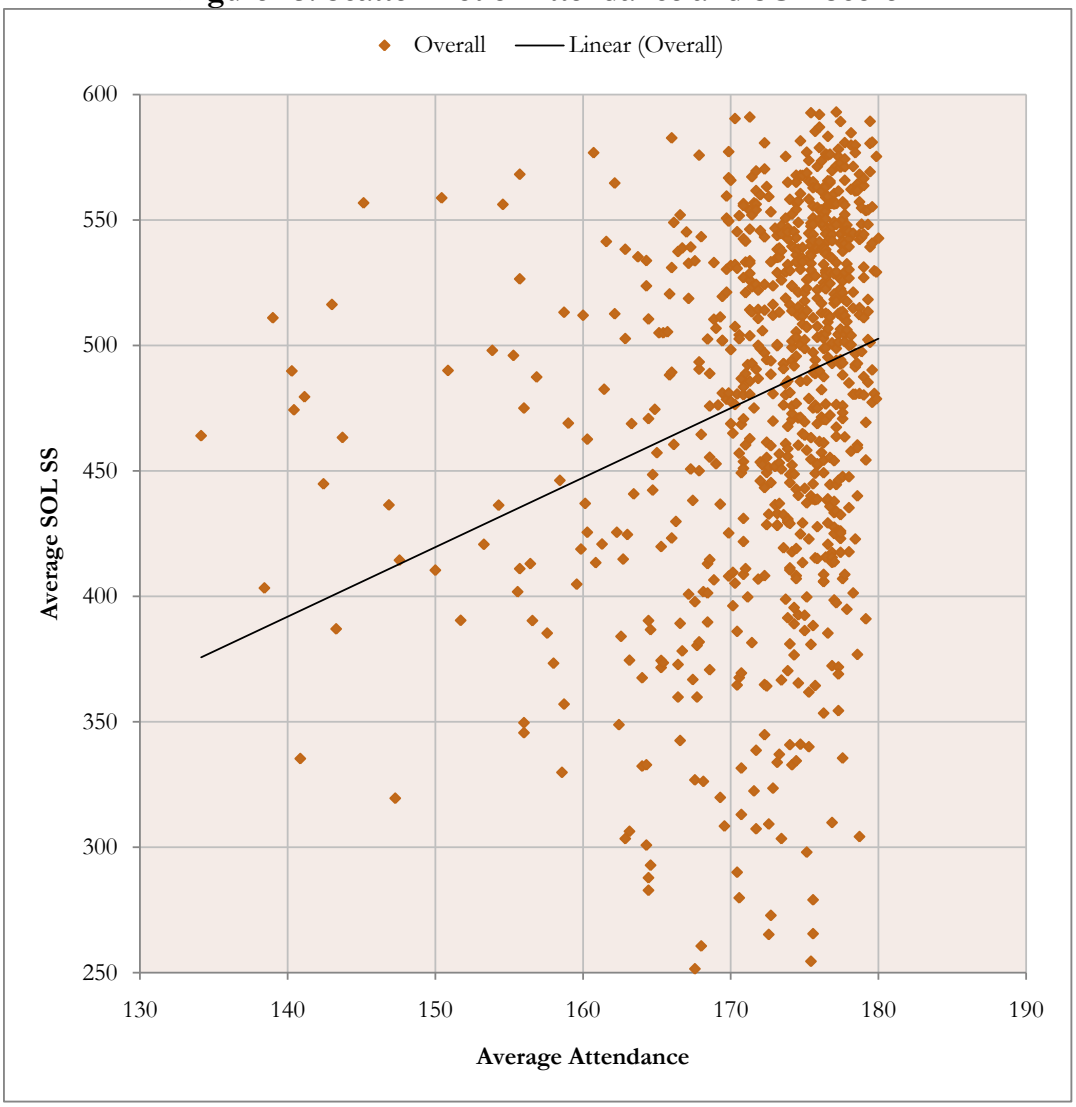
*Differences between Passing Statuses Statistically Significant at p<0.001

What is the relationship between days of attendance and test scores among identified groups?

Correlation between Attendance and Test Scores

Figure 25 depicts the overall relationship between attendance and SOL test scores. We essentially calculated the average SOL score for each student across each grade and compared it with their average annual attendance. Based on this graph alone, we can assume that **the correlation between attendance and test score would be low**. This is because there is not enough variation in the attendance measure: The majority of students attended between 170 and 180 days of school a year, on average.

Figure 25: Scatter Plot of Attendance and SOL Score



The table below confirms the above assumption. Half of the correlations are not statistically significant; which means that the level of association is not reliable. Even measures that were found to be statistically significant posted low levels of correlation. Male students have the highest correlation level among the identified groups, signifying that the relationship between attendance and SOL score is the strongest, relatively speaking, among males. Even so, the correlation coefficient is only 0.3 which means the relationship is not strong.

Table 5: Attendance and SOL Score

Student Type	Correlation between Attendance and Overall SOL Scaled Score	Student Type	Correlation between Attendance and Overall SOL Scaled Score
Male	0.306***	Hispanic	0.195***
Overall	0.262***	SPED	0.185
Black	0.234	LEP	0.147
White	0.231***	Asian	0.135
Female	0.230***	Econ. Disadvantaged	0.127

Correlation Statistically Significant at $p<0.01$

We should state one important caveat pertaining to the above analysis. While we were **not able to find a strong relationship between attendance and test scores, we were able to determine that those who had above average attendance tend to perform better** than those who had below average attendance (See Figure 23). This finding is statistically significant for every grade level (See Table 3).

What is the relationship between days of attendance in one school year and math enrollment in the following school year?

Correlation between Past Attendance and Future Enrollment

We once again conducted a correlation analysis to answer the above question. We compared days present from 2005 to 2008 with course category from grade six (2006) to grade nine (2009). The fields in yellow are the correlation coefficients of the relationship between "…days of attendance in one school year" (e.g., *Days Present 2005-06*), and "…math enrollment in the following year" (e.g., *Grade 6 Course Category*).

The correlations below are very low, suggesting there is hardly any association between days of attendance in one school year and the corresponding course enrollment level in the following school year.

Table 6: Past Attendance and Future Enrollment

	Days Present 2005-06	Days Present 2006-07	Days Present 2007-08	Days Present 2008-09
Grade 6 Course Category	0.1021	0.2226	0.2094	0.2443
Grade 7 Course Category	0.0912	0.2449	0.2103	0.2665
Grade 8 Course Category	0.1118	0.2594	0.246	0.2819
Grade 9 Course Category	0.1024	0.2496	0.249	0.2014

Correlation Statistically Significant at $p<0.01$

What other findings does Hanover identify?

Predicting Students' Test Scores

While the above analyses provide insight into the relationship between key variables, they do not provide a model that fully encapsulates why students score differently on standardized tests. To do so it is necessary to conduct an analysis that takes into account all of the factors within one model. To answer this question we conducted a regression analysis that attempts to explain the SOL score for each student (See appendix for note on regression analysis).

From the regression output below, we determined that all but two indicators influence a student's SOL test score. The **two indicators that are not significant are gender and economically disadvantaged status** (see P>|z| for p-value).

The indicators impact test scores differently from one another (see Coefficient sign for +/- values, to determine whether an indicator impacts the SOL test positively or negatively). **LEP and SPED status impacts the SOL test negatively** (i.e., students with these statuses are likely to do poorer than students without these designations). Similarly students taking **summer courses are more likely to score lower** on the test. While female students and economically disadvantaged students tend to score lower on the SOL test than their respective counterparts, these findings are not statistically significant.

Students who have **good attendance records tend to score better** on the SOL test; although the regression coefficient is very small (0.54) compared to that of the other groups. Likewise, students in a **higher course category performed better** on average than students in a lower course category.

In terms of race, we can interpret the findings in relation to black students (the variable that was omitted in the analysis). Based on the regression output, **white, Asian and Hispanic students performed better** on the SOL test relative to black students.

Overall the model is statistically significant (Prob. > chi2 = 0.000). The model explains 44.8 percent of why students scored differently on the SOL (R-sq overall). The model explains 65.7 percent of why groups score differently over time on the SOL test (R-sq between). The model does not explain very well why individuals score differently over time on the SOL test (R-Sq within of 2 percent).

Table 7: Regression Results

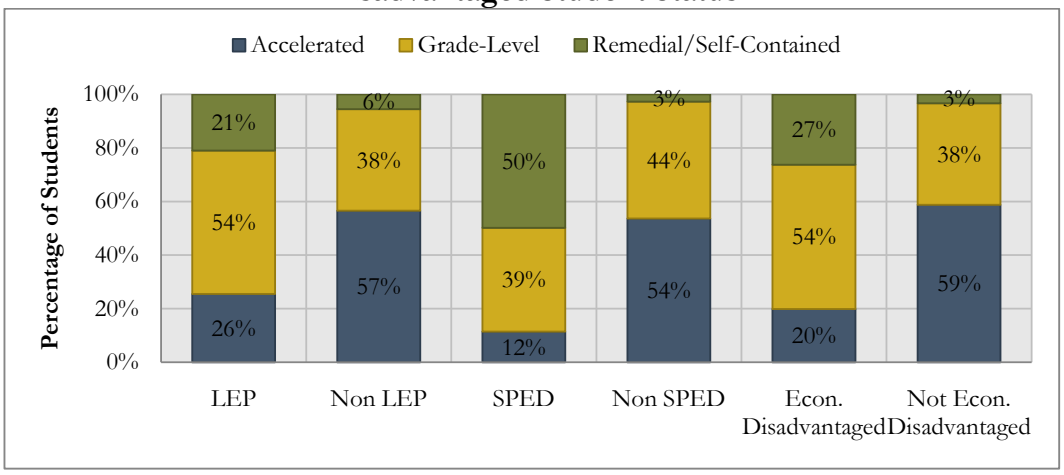
Random-effects GLS regression			Number of obs	= 3019
Group variable: id			Number of groups	= 802
R-sq: within	= 0.0223		Obs per group: min	= 1
between	= 0.6572		avg	= 3.8
overall	= 0.4481		max	= 4
Random effects u_i ~ Gaussian			Wald chi2(9)	= 1313.42
corr(u_i, X)	= 0 (assumed)		Prob > chi2	= 0.0000
SOL Scaled Score	**Coefficient**	**Standard Error**	**Z**	**P>|z|**
white	31.74745	5.158526	6.15	0.000
asian	30.90128	6.615786	4.67	0.000
hispanic	22.58993	5.867161	3.85	0.000
female	-3.66546	2.910641	-1.26	0.208
lep	-25.3808	4.150375	-6.12	0.000
sped	-19.2529	5.021941	-3.83	0.000
disadvantaged	-8.82321	4.006734	-2.2	0.028
dayspresent	0.534786	0.150716	3.55	0.000
summercourse	-28.6068	3.958343	-7.23	0.000
coursecategory	23.00851	1.362288	16.89	0.000
_cons	233.1229	27.86846	8.37	0.000

Appendix

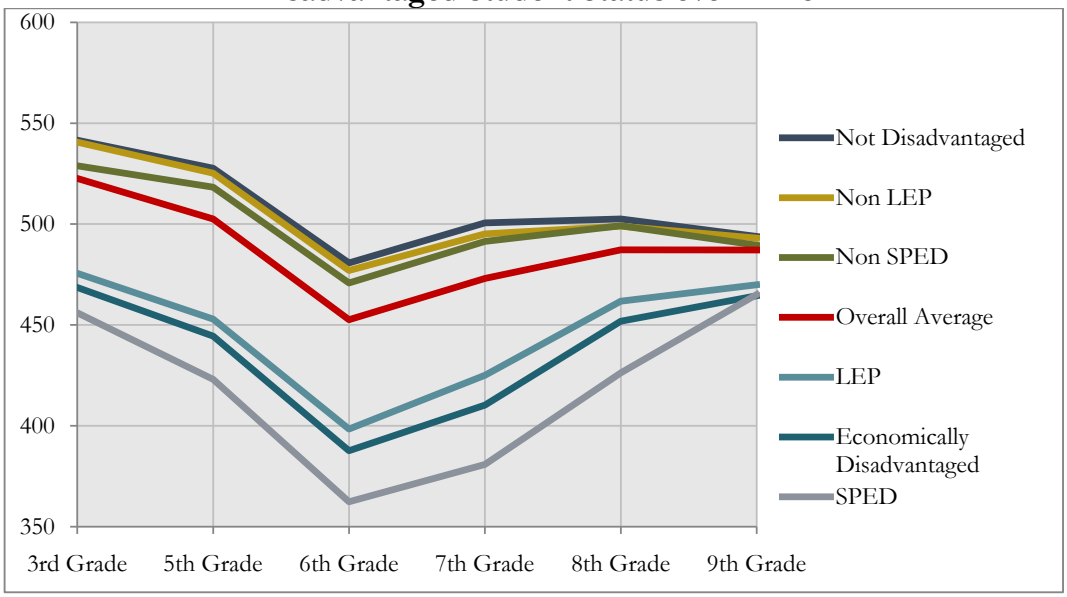
Course Level and Achievement Figures for LEP, SPED, and Economically Disadvantaged Students

The two graphs below provide a summary of the course level breakdown for LEP, SPED, and economically disadvantaged students. The purpose of these graphs is to display the differences between students who were designated these statuses, and students who were not.

Appendix 1: Overall Course Level by LEP, SPED, and Economically Disadvantaged Student Status



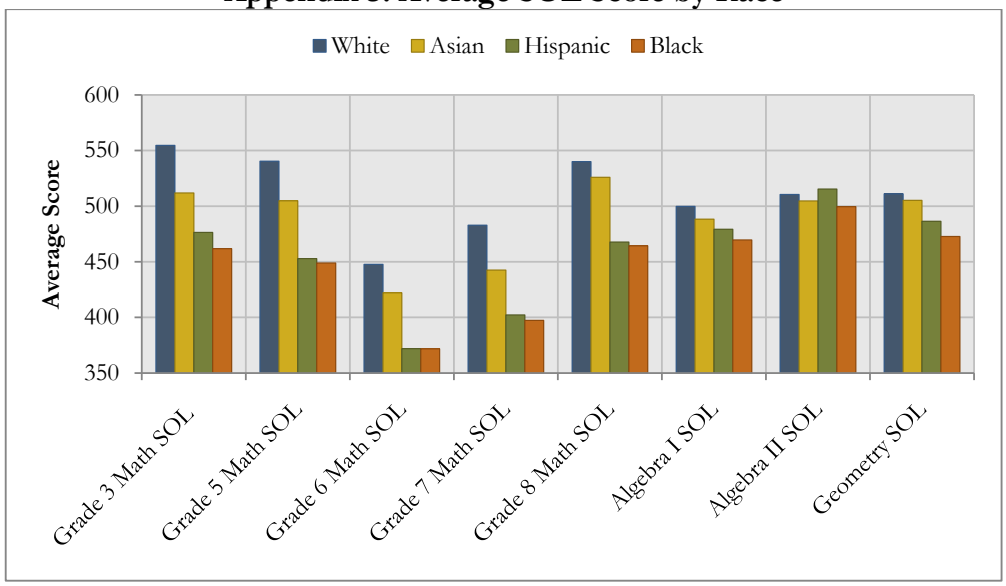
Appendix 2: Average SOL Score by LEP, SPED, and Economically Disadvantaged Student Status over Time



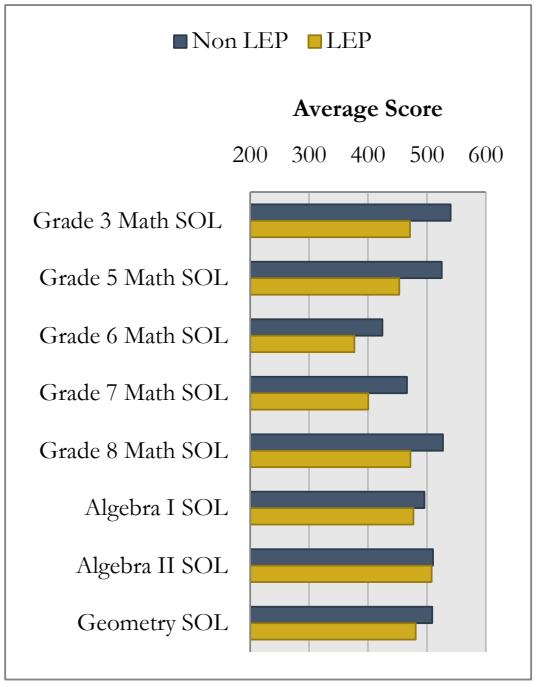
SOL Scaled Score by Student Group

While the analysis in the main body of the report provides findings *based on grade*, the following graphs present SOL test results *based on the test taken*.

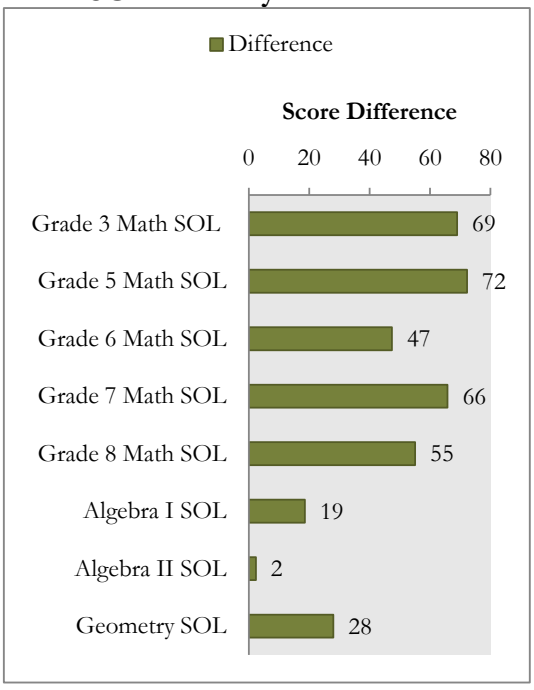
Appendix 3: Average SOL Score by Race



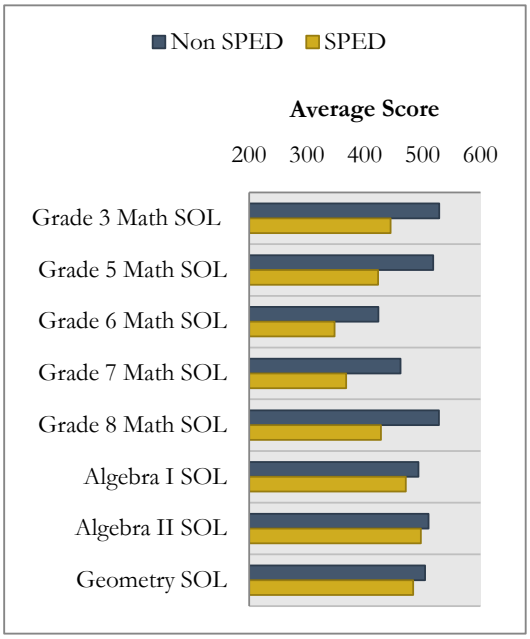
Appendix 4: Average SOL Score by LEP Status



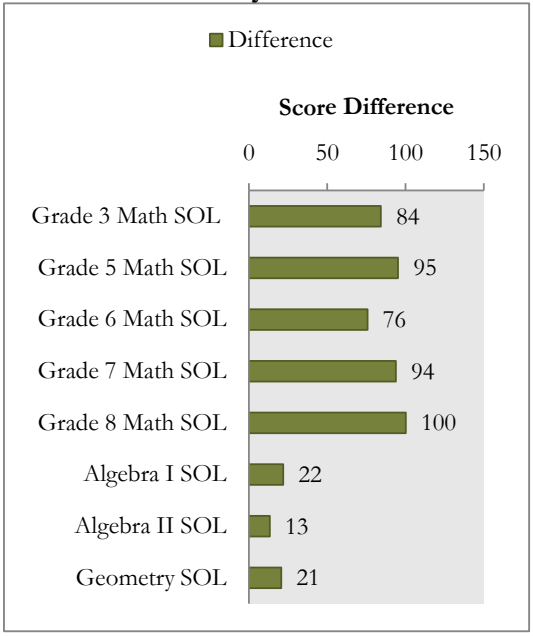
Appendix 5: Difference in Average SOL Score by LEP Status



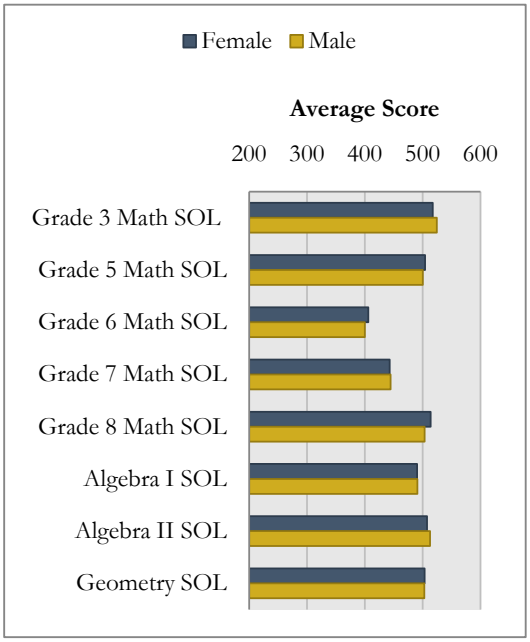
Appendix 6: Average SOL Score by SPED Status



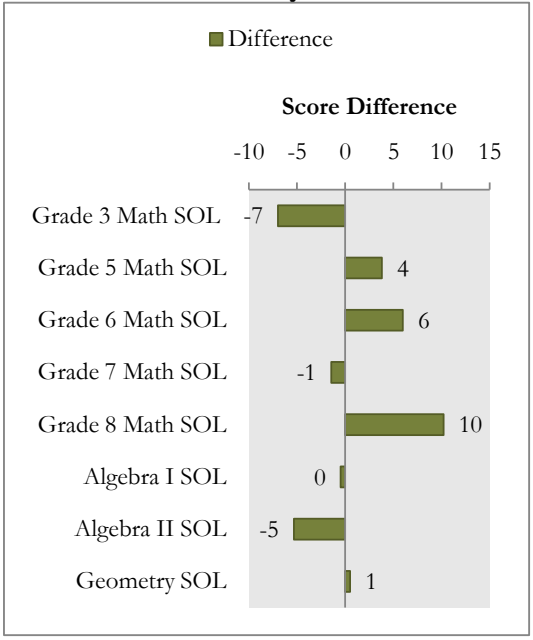
Appendix 7: Difference in Average SOL Score by SPED Status



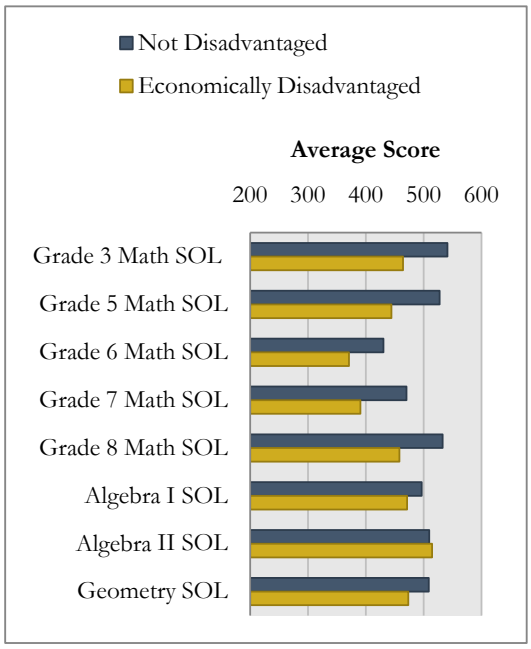
Appendix 8: Average SOL Score by Gender



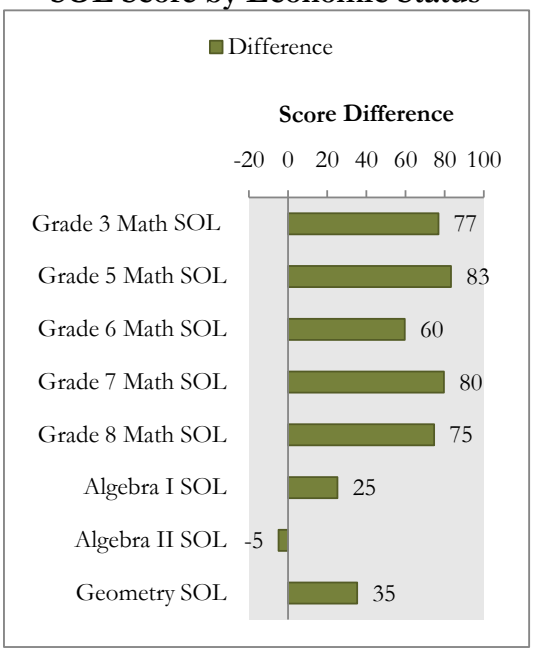
Appendix 9: Difference in Average SOL Score by Gender



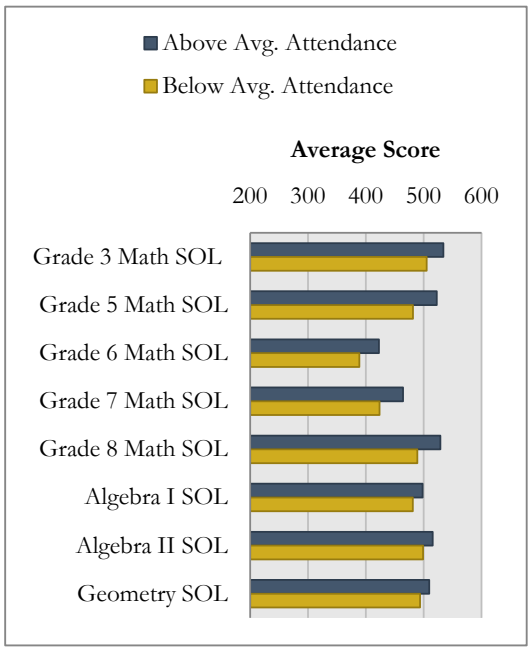
Appendix 10: Average SOL Score by Economic Status



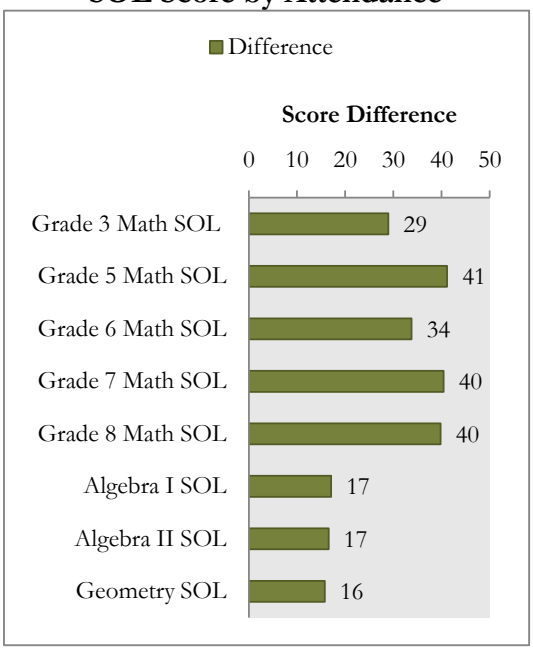
Appendix 11: Difference in Average SOL Score by Economic Status



Appendix 12: Average SOL Score by Attendance



Appendix 13: Difference in Average SOL Score by Attendance



A Note on Correlation Analysis

A correlation analysis measures how closely two indicators are to each other. When one variable *increases* and the other *decreases*, this is considered a negative correlation (e.g. standard of living and poverty). When one variable *increases* and the other *increases* as well, this is called a positive correlation (e.g. standard of living and wealth). When two variables both *decrease* at the same time, this is also called a positive correlation (as long as they are moving in the same direction, correlations are deemed positive).

A perfect positive relationship between two indicators is given the value of 1 and a perfect negative relationship is -1. A value of zero means that there is no relationship whatsoever between two indicators. Correlation does not denote causation. This means that two indicators might be strongly related to each other, but there is no way of telling which one causes the other to increase or decrease.

We consider the correlation between course level and test score a "moderate" and positive correlation. The value of 0.6 is positive because both course level and test score increase in unison. The value is closer to 1 than 0, but the relationship is not as strong as 0.8, for instance, which is why the relationship is considered a moderate one. A value of 0.8 and above would be considered a very strong correlation in social science.

A Note on Regression Analysis

A regression analysis is similar to the correlation analysis. It is a more robust analysis and can be used to predict future relationships. It is usually used when we believe that one variable impacts the other. In this case, we theorize that days of attendance, among other measures, would impact test scores.

In regression analysis, one variable is called the *dependent variable* and the other is called the *independent variable*. An independent variable is a variable that essentially influences the dependent variable. It is possible to include more than one independent variable in the analysis. For our analysis, the dependent variable is SOL Scaled Score and the independent variables are the various race categories, LEP status, SPED status, economically disadvantaged status, gender, course level, and summer course taken. We analyzed how strongly these factors, in unison, impact a student's test score.

The way one interprets the strength of a regression relationship is to look at the R^2 value. Unlike correlation analysis, regression analysis provides a value that is between 0 and 1 (whereas correlation analysis provides a value between -1 and 1). A value of 0 means there is no relationship, and a value of 1 means a perfect relationship between variables. The value can be interpreted as a percentage.

The R^2 measures how much a dependent variable (SOL score) would change based on a change in the independent variable (the various demographic indicators). In our analysis the overall R^2 is 0.45 or 45 percent. This means that these indicators together are responsible for 45 percent of why test scores are different from one student to another. The remaining 55 percent – that may explain why students have different test scores – is unknown. The 55 percent could be from other excluded variables (e.g. a student's household income, the number of hours they spent studying, etc.).

We can interpret whether a relationship is positive, negative or nonexistent, in the regression analysis. To do this we look at the sign of each coefficient in the table. If the coefficient is positive then it means that there is a positive relationship between the demographic measure and the SOL test score (e.g., dayspresent is positive); a coefficient value that is negative means that there is a negative relationship between the two variables (e.g., lep is negative).

The type of regression model that we ran is called a panel regression (random effects model). This is the type of regression that is conducted for longitudinal data. The benefit of this type of regression is that we can determine the changes between groups as well as the changes within an individual over time.

Project Evaluation Form

Hanover Research is committed to providing a work product that meets or exceeds member expectations. In keeping with that goal, we would like to hear your opinions regarding our reports. Feedback is critically important and serves as the strongest mechanism by which we tailor our research to your organization. When you have had a chance to evaluate this report, please take a moment to fill out the following questionnaire.

http://www.hanoverresearch.com/evaluation/index.php

Note

This brief was written to fulfill the specific request of an individual member of Hanover Research. As such, it may not satisfy the needs of all members. We encourage any and all members who have additional questions about this topic – or any other – to contact us.

Caveat

The publisher and authors have used their best efforts in preparing this brief. The publisher and authors make no representations or warranties with respect to the accuracy or completeness of the contents of this brief and specifically disclaim any implied warranties of fitness for a particular purpose. There are no warranties which extend beyond the descriptions contained in this paragraph. No warranty may be created or extended by representatives of Hanover Research or its marketing materials. The accuracy and completeness of the information provided herein and the opinions stated herein are not guaranteed or warranted to produce any particular results, and the advice and strategies contained herein may not be suitable for every member. Neither the publisher nor the authors shall be liable for any loss of profit or any other commercial damages, including but not limited to special, incidental, consequential, or other damages. Moreover, Hanover Research is not engaged in rendering legal, accounting, or other professional services. Members requiring such services are advised to consult an appropriate professional.

CLASS OF 2012

Any Mathematics SOL Test Results by School Year

	Grade by School Year									
	Grade 6 2005-06		Grade 7 2006-07		Grade 8 2007-08		Grade 9 2008-09		Grade 10 2009-10	
Identified Categories	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing
Asian	38	87%	41	93%	50	100%	63	100%	55	96%
Asian, EconDis	12	67%	15	73%	13	100%	21	100%	21	95%
Asian, EconDis, LEP	53	47%	44	66%	42	98%	36	97%	36	92%
Asian, EconDis, SPED, LEP	4	0%	*		*					
Asian, LEP	23	48%	26	65%	28	100%	23	100%	21	86%
Asian, SPED	*		*		*		*		*	
Asian, SPED, LEP	*		3	33%	3	67%			2	100%
Black	74	45%	74	46%	75	92%	65	95%	82	82%
Black, EconDis	62	26%	51	37%	48	94%	43	93%	44	75%
Black, EconDis, LEP	9	11%	10	20%	12	67%	7	71%	8	100%
Black, EconDis, SPED	29	3%	26	0%	27	41%	4	75%	18	83%
Black, EconDis, Sped, LEP	*		*		*				*	
Black, LEP	*		3	0%	4	50%	3	67%	5	80%
Black, SPED	24	4%	26	4%	22	36%	*		17	76%
Black, SPED, LEP	*		*							
Hispanic	33	79%	45	87%	62	98%	64	95%	88	89%
Hispanic, EconDis	24	54%	36	69%	42	98%	47	98%	68	84%
Hispanic, EconDis, LEP	172	31%	135	25%	114	73%	82	91%	75	80%
Hispanic, EconDis, SPED	7	0%	6	17%	7	43%	4	100%	18	61%
Hispanic, EconDis, SPED, LEP	58	10%	52	12%	53	36%	8	75%	17	88%
Hispanic, LEP	41	41%	36	44%	39	82%	17	100%	20	70%
Hispanic, SPED	7	43%	6	33%	7	71%	8	100%	13	85%
Hispanic, SPED, LEP	10	20%	7	14%	14	50%	*		*	
Other (or MultipleRace)	5	60%	4	50%	5	100%	4	100%	5	80%
Other (or MultipleRace), EconDis	*		*						*	
Other (or MultipleRace), EconDis, SPED							*		*	
White	478	86%	474	93%	491	99%	488	99%	376	97%
White, EconDis	20	65%	13	69%	10	90%	10	80%	15	87%
White, EconDis, LEP	8	13%	10	20%	7	71%	*		11	100%
White, EconDis, SPED	4	25%	8	13%	4	50%	*		5	20%
White, EconDis, SPED, LEP	3	33%	*		*					
White, LEP	12	58%	11	73%	15	93%	10	100%	*	
White, SPED	72	54%	58	47%	65	75%	39	87%	60	90%
White, SPED, LEP	4	50%	4	25%	*		*		*	
Total	1296	56%	1233	62%	1268	87%	1056	96%	1089	89%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Grade 3 SOL

Across five years

Identified Categories	SchoolYear 2005-06 Tested	2005-06 % Passed	2006-07 Tested	2006-07 % Passed	2007-08 Tested	2007-08 % Passed	2008-09 Tested	2008-09 % Passed	2009-10 Tested	2009-10 % Passed
Asian	50	100%	47	100%	41	100%	57	100%	56	100%
Asian, EconDis	4	100%	5	100%	4	75%	3	100%	5	60%
Asian, EconDis, LEP	60	97%	59	98%	52	94%	53	85%	74	97%
Asian, EconDis, SPED	*				3	67%			3	100%
Asian, EconDis, SPED, LEP	4	50%	*		9	44%	3	33%	3	67%
Asian, LEP	22	95%	32	94%	39	97%	29	100%	43	100%
Asian, SPED	*		5	100%	4	75%	6	67%	6	83%
Asian, SPED, LEP			3	100%	6	83%	*		3	67%
Black	58	97%	62	89%	55	93%	53	91%	54	94%
Black, EconDis	60	85%	41	73%	47	74%	41	80%	42	90%
Black, EconDis, LEP	27	96%	24	88%	36	75%	20	90%	40	78%
Black, EconDis, SPED	13	54%	20	50%	10	20%	22	27%	17	53%
Black, EconDis, Sped, LEP	5	60%			*		7	71%	3	67%
Black, LEP	5	100%	9	89%	7	100%	7	86%	14	93%
Black, SPED	9	89%	16	44%	16	56%	6	67%	3	33%
Black, SPED, LEP			*						*	
Hispanic	25	96%	24	96%	34	94%	40	98%	34	100%
Hispanic, EconDis	11	100%	9	78%	5	80%	13	92%	11	100%
Hispanic, EconDis, LEP	187	82%	182	75%	193	81%	214	87%	210	92%
Hispanic, EconDis, SPED	5	60%	2	100%	3	33%	*		5	100%
Hispanic, EconDis, SPED, LEP	58	66%	56	59%	55	49%	63	60%	64	67%
Hispanic, LEP	45	89%	41	88%	39	77%	44	75%	33	97%
Hispanic, SPED	7	71%	5	80%	5	60%	7	100%	7	100%
Hispanic, SPED, LEP	16	81%	10	60%	14	50%	10	30%	11	45%
Other (or MultipleRace)	5	100%	10	100%	10	100%	15	100%	18	100%
Other (or MultipleRace), EconDis	*		*		6	100%	*		3	100%
Other (or MultipleRace), EconDis, SPED					*				*	
Other (or MultipleRace), EconDis, SPED, LEP	*									
Other (or MultipleRace), LEP	*		*				*		*	
Other (or MultipleRace), SPED					*		7	86%	3	100%
Other (or MultipleRace), SPED, LEP			*				3	67%	*	
White	502	100%	532	99%	596	98%	570	99%	681	100%
White, EconDis	19	100%	5	100%	9	100%	13	85%	8	100%
White, EconDis, LEP	11	64%	15	80%	11	100%	21	81%	20	90%
White, EconDis, SPED	5	80%	4	75%	*		*		*	
White, EconDis, SPED, LEP	6	50%	*				*		*	
White, LEP	9	89%	18	100%	23	96%	31	97%	34	100%
White, SPED	95	93%	79	92%	85	87%	68	88%	103	92%
White, SPED, LEP	3	67%	*		3	67%	3	67%		
Total	1333	92%	1326	89%	1426	88%	1440	90%	1619	94%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Grade 4 SOL

Across five years

Identified Categories	SchoolYear									
	2005-06		2006-07		2007-08		2008-09		2009-10	
	Tested	% Passed	Tested	% Passed	Tested	% Passed	Tested	% Passed	Tested	% Passed
Asian	36	97%	52	98%	48	100%	40	100%	57	96%
Asian, EconDis	3	100%	3	100%	3	100%	5	60%		
Asian, EconDis, LEP	57	77%	58	79%	56	88%	55	98%	50	90%
Asian, EconDis, SPED										
Asian, EconDis, SPED, LEP	4	25%	3	0%	3	67%	9	44%	6	50%
Asian, LEP	35	77%	25	88%	35	89%	27	89%	33	100%
Asian, SPED	8	25%	3	100%			3	100%	10	70%
Asian, SPED, LEP	5	40%					4	25%		
Black	51	75%	60	78%	68	72%	57	79%	58	91%
Black, EconDis	50	64%	47	68%	33	52%	48	69%	45	78%
Black, EconDis, LEP	32	47%	22	91%	23	83%	31	68%	27	96%
Black, EconDis, SPED	22	27%	12	17%	18	33%	12	25%	19	21%
Black, EconDis, Sped, LEP	7	57%	5	60%					6	67%
Black, LEP	8	63%	8	100%	11	91%	7	100%	6	100%
Black, SPED	13	31%	13	54%	20	30%	13	46%	9	33%
Black, SPED, LEP										
Hispanic	40	83%	25	100%	23	91%	39	92%	39	100%
Hispanic, EconDis	5	80%	12	67%	6	100%	7	86%	21	86%
Hispanic, EconDis, LEP	192	59%	173	60%	172	72%	195	68%	210	80%
Hispanic, EconDis, SPED					5	40%	5	20%		
Hispanic, EconDis, SPED, LEP	47	28%	62	31%	56	34%	54	28%	60	40%
Hispanic, LEP	32	78%	51	80%	42	79%	40	68%	36	83%
Hispanic, SPED	8	75%	7	71%	4	25%	7	14%	8	13%
Hispanic, SPED, LEP	9	56%	8	50%	12	58%	8	75%	8	38%
Other (or MultipleRace)	6	83%	5	100%	9	100%	14	86%	15	100%
Other (or MultipleRace), EconDis	*				*		*			
Other (or MultipleRace), EconDis, LEP			*							
Other (or MultipleRace), EconDis, SPED	*				*		*			
Other (or MultipleRace), EconDis, SPED, LEP			*							
Other (or MultipleRace), LEP			*		*					
Other (or MultipleRace), SPED							4	50%	4	25%
Other (or MultipleRace), SPED, LEP									3	67%
White	495	96%	524	98%	545	96%	594	97%	561	98%
White, EconDis	11	82%	8	100%	4	100%	16	81%	15	73%
White, EconDis, LEP	13	69%	12	58%	11	64%	10	80%	19	79%
White, EconDis, SPED	13	54%	4	50%	*		*		*	
White, EconDis, SPED, LEP	4	0%	4	75%	*				*	
White, LEP	14	93%	19	100%	23	87%	22	100%	35	91%
White, SPED	84	82%	90	76%	88	88%	82	77%	70	70%
White, SPED, LEP	*		*		4	50%	*		5	20%
Total	1309	77%	1323	82%	1334	83%	1419	83%	1446	86%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Grade 5 SOL
Across five years

Identified Categories	2005-06		2006-07		2007-08		2008-09		2009-10	
	Tested	% Passed	Tested	% Passed	Tested	% Passed	Tested	% Passed	Tested	% Passed
Asian	24	96%	40	100%	54	98%	49	100%	43	100%
Asian, EconDis	5	60%	13	85%	6	83%	5	100%	10	90%
Asian, EconDis, LEP	61	84%	51	88%	46	87%	51	90%	54	98%
Asian, EconDis, SPED			*		*				*	
Asian, EconDis, SPED, LEP	6	67%	4	50%	3	67%	4	75%	7	43%
Asian, LEP	29	90%	28	93%	35	94%	27	93%	17	100%
Asian, SPED	6	83%	7	86%	5	100%	*		4	100%
Asian, SPED, LEP	*		4	75%	*				*	
Black	50	86%	63	83%	61	85%	65	94%	52	94%
Black, EconDis	54	69%	44	70%	46	76%	49	84%	63	87%
Black, EconDis, LEP	22	64%	27	96%	18	89%	17	82%	35	89%
Black, EconDis, SPED	19	21%	18	50%	15	20%	21	43%	13	46%
Black, EconDis, Sped, LEP	4	50%	6	50%	5	20%			*	
Black, LEP	7	86%	8	50%	7	100%	10	100%	6	100%
Black, SPED	15	40%	18	50%	12	50%	15	47%	10	70%
Black, SPED, LEP	*		*				*		*	
Hispanic	28	96%	50	96%	41	100%	28	96%	40	98%
Hispanic, EconDis	19	84%	15	73%	20	100%	15	100%	13	100%
Hispanic, EconDis, LEP	195	69%	149	77%	150	72%	172	81%	191	86%
Hispanic, EconDis, SPED	3	67%	*		4	50%	4	75%	5	40%
Hispanic, EconDis, SPED, LEP	72	35%	47	43%	55	64%	61	57%	50	50%
Hispanic, LEP	38	84%	34	74%	47	87%	33	85%	32	91%
Hispanic, SPED	4	100%	9	89%	6	83%	3	33%	*	
Hispanic, SPED, LEP	9	22%	9	67%	14	57%	7	57%	9	89%
Other (or MultipleRace)	5	100%	6	100%	5	100%	9	100%	13	92%
Other (or MultipleRace), EconDis			*		*		*		3	100%
Other (or MultipleRace), EconDis, LEP									*	
Other (or MultipleRace), EconDis, SPED	*		*				*			
Other (or MultipleRace), LEP	*				*					
Other (or MultipleRace), SPED									3	100%
White	449	98%	505	98%	534	100%	551	98%	581	99%
White, EconDis	17	94%	9	89%	8	88%	5	100%	12	92%
White, EconDis, LEP	11	100%	9	67%	7	71%	17	59%	10	70%
White, EconDis, SPED	5	80%	4	75%						
White, EconDis, SPED, LEP	*		3	67%	3	0%	*		*	
White, LEP	12	83%	22	86%	15	100%	21	100%	18	94%
White, SPED	70	90%	71	87%	82	88%	75	89%	90	90%
White, SPED, LEP	*		*		*		3	33%	*	
Total	1245	82%	1280	87%	1312	88%	1324	89%	1399	92%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Grade 6 Math SOL

Across five years

Identified Categories	SchoolYear									
	2005-06		2006-07		2007-08		2008-09		2009-10	
	Tested	% Passed	Tested	% Passed	Tested	% Passed	Tested	% Passed	Tested	% Passed
Asian	12	67%	11	73%	17	82%	24	88%	22	91%
Asian, EconDis	5	40%	*		7	57%	6	83%	3	100%
Asian, EconDis, LEP	36	33%	41	63%	34	47%	39	56%	49	67%
Asian, EconDis, SPED			*		3	33%				
Asian, EconDis, SPED, LEP	4	0%	4	0%	3	0%	*		6	17%
Asian, LEP	10	10%	17	71%	20	80%	18	72%	14	64%
Asian, SPED	*		*		5	20%	7	71%	*	
Asian, SPED, LEP	*		3	67%	5	60%	*		*	
Black	46	24%	45	53%	39	38%	50	64%	58	69%
Black, EconDis	54	20%	33	39%	38	29%	41	56%	51	43%
Black, EconDis, LEP	8	0%	15	27%	11	18%	11	82%	15	53%
Black, EconDis, SPED	29	3%	22	14%	18	11%	23	4%	21	10%
Black, EconDis, Sped, LEP	*		3	0%	7	29%	4	25%		
Black, LEP	*		7	29%	6	17%	3	100%	8	75%
Black, SPED	24	4%	20	20%	22	14%	11	18%	12	0%
Black, SPED, LEP	*		*		3	67%			*	
Hispanic	18	61%	15	73%	33	64%	33	91%	23	78%
Hispanic, EconDis	9	33%	18	50%	21	57%	21	76%	22	64%
Hispanic, EconDis, LEP	140	20%	157	36%	124	40%	132	32%	140	56%
Hispanic, EconDis, SPED	7	0%	3	0%	4	0%	5	40%	4	0%
Hispanic, EconDis, SPED, LEP	57	9%	69	10%	41	2%	57	11%	55	15%
Hispanic, LEP	28	18%	23	43%	28	32%	36	61%	26	42%
Hispanic, SPED	6	33%	3	100%	12	33%	7	43%	4	25%
Hispanic, SPED, LEP	10	20%	11	0%	8	38%	12	17%	6	17%
Other (or MultipleRace)	4	50%	*		6	50%	4	75%	3	100%
Other (or MultipleRace), EconDis	*				*		*			
Other (or MultipleRace), EconDis, SPED									*	
Other (or MultipleRace), SPED			*		*					
White	99	61%	147	86%	195	83%	251	86%	288	93%
White, EconDis	12	58%	15	80%	8	63%	9	89%	9	100%
White, EconDis, LEP	6	17%	5	60%	8	63%	6	33%	12	42%
White, EconDis, SPED	4	25%			*		3	0%	*	
White, EconDis, SPED, LEP	3	33%	*		*		3	0%	*	
White, LEP	7	43%	14	50%	13	62%	10	40%	15	87%
White, SPED	52	42%	41	46%	49	37%	58	52%	59	66%
White, SPED, LEP	3	33%	*				*		3	0%
Total	703	29%	754	49%	794	50%	888	59%	934	66%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Grade 7 Mathematics SOL
Across five years

Identified Categories	SchoolYear									
	2005-06		2006-07		2007-08		2008-09		2009-10	
	Total	% Passing	Total	% Passing	Total	% Passing	Total	% Passing	Total	% Passing
Asian	25	76%	22	77%	42	86%	39	97%	44	95%
Asian, EconDis	10	60%	10	60%	7	86%	12	75%	6	83%
Asian, EconDis, LEP	52	35%	44	64%	43	72%	38	74%	48	83%
Asian, EconDis, SPED	*						*			
Asian, EconDis, SPED, LEP	7	0%	3	33%	8	50%	3	33%	4	0%
Asian, LEP	20	60%	20	55%	20	70%	22	68%	17	65%
Asian, SPED	*		*		*		4	0%	6	67%
Asian, SPED, LEP	2	0%	3	33%			3	0%		
Black	76	38%	60	32%	61	62%	48	67%	52	71%
Black, EconDis	44	30%	44	27%	42	45%	40	60%	50	60%
Black, EconDis, LEP	12	17%	13	38%	16	44%	11	45%	10	70%
Black, EconDis, SPED	26	8%	26	0%	23	13%	14	7%	24	13%
Black, EconDis, Sped, LEP	*		*		4	0%	7	57%	3	33%
Black, LEP	6	0%	7	57%	7	71%	4	50%	3	67%
Black, SPED	23	9%	27	4%	12	17%	21	10%	14	14%
Black, SPED, LEP	*		*		*		4	25%		
Hispanic	27	56%	31	84%	34	85%	42	81%	38	84%
Hispanic, EconDis	36	33%	20	50%	25	56%	31	87%	35	66%
Hispanic, EconDis, LEP	136	24%	126	19%	134	43%	131	51%	143	41%
Hispanic, EconDis, SPED	15	7%	7	29%	4	0%	4	0%	4	25%
Hispanic, EconDis, SPED, LEP	49	6%	53	13%	55	16%	42	7%	60	15%
Hispanic, LEP	37	43%	41	51%	37	51%	25	52%	34	59%
Hispanic, SPED	8	13%	6	33%	3	67%	12	17%	12	50%
Hispanic, SPED, LEP	12	0%	8	25%	13	0%	10	20%	8	13%
Other (or MultipleRace)	3	33%	3	33%	3	100%	8	75%	8	88%
Other (or MultipleRace), EconDis			*						*	
Other (or MultipleRace), EconDis, SPED	*				*		*			
Other (or MultipleRace), SPED					*					
White	389	79%	320	87%	376	91%	416	97%	417	95%
White, EconDis	16	44%	8	50%	4	100%	14	93%	9	78%
White, EconDis, LEP	10	20%	11	18%	7	43%	8	63%	10	50%
White, EconDis, SPED	5	0%	8	13%	*		3	33%	*	
White, EconDis, SPED, LEP			*		*		*		3	33%
White, LEP	7	43%	5	40%	16	69%	16	63%	10	60%
White, SPED	73	32%	53	40%	46	54%	61	61%	62	53%
White, SPED, LEP	2	50%	3	0%					*	
Total	1133	47%	989	51%	1048	65%	1097	72%	1138	70%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Grade 8 Mathematics SOL
Across five years

Identified Categories	SchoolYear									
	2005-06		2006-07		2007-08		2008-09		2009-10	
	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing
Asian	33	94%	29	100%	30	100%	43	95%	44	100%
Asian, EconDis	15	93%	5	100%	16	100%	8	100%	9	100%
Asian, EconDis, LEP	35	66%	43	81%	30	97%	33	85%	39	85%
Asian, EconDis, SPED	3	0%	2	0%			*		*	
Asian, EconDis, SPED, LEP	5	40%	9	11%	3	67%	7	71%	4	50%
Asian, LEP	19	74%	20	85%	23	100%	14	93%	16	88%
Asian, SPED	*		3	67%	*		*		5	40%
Asian, SPED, LEP	*		*		4	75%			*	
Black	49	67%	58	76%	65	91%	59	86%	38	84%
Black, EconDis	41	61%	40	73%	38	92%	36	78%	33	88%
Black, EconDis, LEP	17	53%	21	62%	16	75%	25	72%	12	92%
Black, EconDis, SPED	30	23%	23	39%	34	38%	22	45%	17	47%
Black, EconDis, Sped, LEP	5	0%	*		3	67%	5	60%	6	50%
Black, LEP	4	75%	6	50%	7	71%	7	86%	5	60%
Black, SPED	25	28%	22	59%	26	35%	15	33%	23	39%
Black, SPED, LEP	5	0%	*		*				5	0%
Hispanic	40	83%	37	89%	42	98%	42	95%	37	89%
Hispanic, EconDis	30	73%	41	73%	30	97%	29	93%	29	93%
Hispanic, EconDis, LEP	117	44%	109	50%	111	72%	118	69%	116	70%
Hispanic, EconDis, SPED	6	17%	14	29%	8	25%	8	50%	10	30%
Hispanic, EconDis, SPED, LEP	40	18%	54	31%	54	35%	53	40%	44	11%
Hispanic, LEP	32	59%	27	85%	39	82%	21	90%	22	86%
Hispanic, SPED	10	20%	9	22%	7	57%	*		10	60%
Hispanic, SPED, LEP	15	20%	14	14%	14	50%	8	25%	8	25%
Other (or MultipleRace)	7	100%	4	75%	5	100%	5	80%	8	100%
Other (or MultipleRace), EconDis, LEP	*						*			
Other (or MultipleRace), EconDis, SPED			*							
Other (or MultipleRace), SPED	*						*		*	
White	353	96%	369	98%	321	98%	370	99%	379	99%
White, EconDis	10	80%	8	75%	9	78%	5	100%	9	100%
White, EconDis, LEP	6	67%	6	50%	9	78%	7	57%	8	50%
White, EconDis, SPED	10	20%	3	33%	3	33%	*		5	40%
White, EconDis, SPED, LEP	*				*				*	
White, LEP	8	75%	9	89%	12	92%	10	90%	13	85%
White, SPED	71	69%	63	62%	59	64%	42	83%	66	73%
White, SPED, LEP	*		*		*		*			
Total	1049	69%	1056	75%	1024	82%	1002	84%	1025	81%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Algebra I SOL
Across five years

Identified Categories	SchoolYear									
	2005-06		2006-07		2007-08		2008-09		2009-10	
	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing
Asian	46	100%	60	100%	49	98%	59	100%	67	97%
Asian, EconDis	24	100%	20	95%	12	92%	28	96%	17	88%
Asian, EconDis, LEP	49	96%	61	93%	73	100%	64	98%	55	96%
Asian, EconDis, SPED	3	100%	*				*			
Asian, EconDis, SPED, LEP	*		*		*		*		4	100%
Asian, LEP	26	85%	38	95%	36	97%	27	100%	26	96%
Asian, SPED	4	75%	3	100%	3	67%	*		*	
Asian, SPED, LEP			3	67%	*		*		*	
Black	68	84%	99	88%	76	87%	102	96%	94	93%
Black, EconDis	57	77%	63	79%	40	90%	52	94%	49	94%
Black, EconDis, LEP	26	77%	28	93%	32	94%	20	95%	34	97%
Black, EconDis, SPED	25	40%	19	58%	10	70%	13	62%	23	87%
Black, EconDis, Sped, LEP	*		*				*		3	67%
Black, LEP	8	100%	9	100%	14	86%	12	92%	12	83%
Black, SPED	17	59%	9	22%	28	75%	17	65%	22	73%
Black, SPED, LEP	*		*				*			
Hispanic	67	87%	67	88%	73	90%	59	97%	66	98%
Hispanic, EconDis	84	87%	67	81%	53	87%	59	92%	62	90%
Hispanic, EconDis, LEP	150	83%	128	81%	138	88%	158	90%	152	88%
Hispanic, EconDis, SPED	10	90%	13	85%	12	83%	23	83%	15	80%
Hispanic, EconDis, SPED, LEP	10	70%	15	73%	13	100%	20	85%	20	90%
Hispanic, LEP	45	87%	41	71%	59	85%	39	79%	41	83%
Hispanic, SPED	14	71%	15	53%	7	43%	12	83%	9	56%
Hispanic, SPED, LEP	4	100%	3	67%	14	43%			4	50%
Other (or MultipleRace)	7	100%	8	100%	4	75%	7	100%	11	91%
Other (or MultipleRace), EconDis	*		*		*				*	
Other (or MultipleRace), EconDis, LEP	*		*						*	
Other (or MultipleRace), EconDis, SPED							*			
Other (or MultipleRace), LEP	*		*							
Other (or MultipleRace), SPED	*				*				*	
White	532	98%	553	98%	554	99%	501	98%	562	99%
White, EconDis	11	100%	10	90%	4	100%	11	91%	16	94%
White, EconDis, LEP	8	75%	14	86%	7	100%	6	100%	15	100%
White, EconDis, SPED	4	50%	5	80%	3	33%	4	50%	*	
White, LEP	17	82%	19	84%	12	100%	17	100%	11	100%
White, SPED	54	85%	64	89%	64	92%	48	94%	59	90%
White, SPED, LEP	*						*			
Total	1380	90%	1441	90%	1395	93%	1370	94%	1456	94%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Geometry SOL
Across five years

Identified Categories	SchoolYear									
	2005-06		2006-07		2007-08		2008-09		2009-10	
	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing
Asian	57	89%	51	94%	62	95%	63	92%	53	92%
Asian, EconDis	23	91%	21	90%	18	89%	21	86%	25	96%
Asian, EconDis, LEP	46	80%	42	88%	49	76%	57	81%	41	85%
Asian, EconDis, SPED	*		*		*		*		*	
Asian, EconDis, SPED, LEP					*				*	
Asian, LEP	10	70%	15	80%	30	93%	23	96%	20	80%
Asian, SPED	3	33%	6	50%	3	33%	*		*	
Asian, SPED, LEP	*				*		*			
Black	60	73%	66	77%	101	71%	78	76%	92	78%
Black, EconDis	43	67%	51	71%	59	56%	49	76%	40	63%
Black, EconDis, LEP	14	79%	16	75%	22	68%	20	60%	13	85%
Black, EconDis, SPED	6	17%	13	23%	14	36%	10	40%	10	20%
Black, EconDis, Sped, LEP			*						*	
Black, LEP	9	67%	7	71%	10	50%	7	71%	13	77%
Black, SPED	7	43%	16	38%	13	23%	19	53%	18	39%
Hispanic	91	87%	73	82%	92	75%	78	85%	73	79%
Hispanic, EconDis	81	86%	71	80%	68	75%	77	77%	74	77%
Hispanic, EconDis, LEP	110	69%	76	75%	86	69%	90	66%	98	77%
Hispanic, EconDis, SPED	8	50%	11	9%	11	45%	12	50%	23	30%
Hispanic, EconDis, SPED, LEP	4	75%	4	0%	4	75%	8	63%	8	88%
Hispanic, LEP	33	55%	27	67%	38	58%	36	64%	29	66%
Hispanic, SPED	9	56%	13	38%	13	77%	17	35%	10	80%
Hispanic, SPED, LEP	*				*		3	67%		
Other (or MultipleRace)	6	100%	7	100%	8	75%	7	71%	9	89%
Other (or MultipleRace), EconDis	*				*				*	
Other (or MultipleRace), EconDis, LEP					*				*	
Other (or MultipleRace), EconDis, SPED							*		*	
Other (or MultipleRace), LEP	*		*							
Other (or MultipleRace), SPED	*		*						*	
White	564	99%	530	97%	536	97%	527	98%	458	97%
White, EconDis	11	73%	6	83%	3	67%	8	75%	16	75%
White, EconDis, LEP	10	90%	3	67%	8	63%	5	80%	6	83%
White, EconDis, SPED	7	86%	3	67%	*		3	0%	5	60%
White, LEP	5	100%	12	75%	12	92%	9	100%	6	100%
White, SPED	58	83%	46	83%	59	85%	60	82%	47	85%
White, SPED, LEP									*	
Total	1282	86%	1190	85%	1327	82%	1292	84%	1197	84%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.

Algebra II SOL
Across five years

Identified Categories	SchoolYear									
	2005-06		2006-07		2007-08		2008-09		2009-10	
	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing	Tested	% Passing
Asian	54	91%	54	89%	49	98%	70	93%	61	97%
Asian, EconDis	25	96%	21	86%	17	88%	20	95%	20	95%
Asian, EconDis, LEP	39	87%	31	87%	33	94%	48	79%	40	80%
Asian, EconDis, SPED	*		*						*	
Asian, EconDis, SPED, LEP							*			
Asian, LEP	7	71%	13	85%	26	96%	20	95%	21	95%
Asian, SPED	3	67%			*		4	75%	*	
Asian, SPED, LEP									*	
Black	75	73%	64	77%	64	72%	88	75%	70	80%
Black, EconDis	42	48%	29	76%	38	66%	48	58%	42	76%
Black, EconDis, LEP	15	80%	18	72%	14	100%	20	80%	11	82%
Black, EconDis, SPED	8	50%	*		4	75%	7	29%	9	67%
Black, EconDis, Sped, LEP	*		*				*			
Black, LEP	5	60%	8	75%	7	57%	8	75%	7	57%
Black, SPED	3	33%	4	25%	7	86%	6	100%	15	53%
Black, SPED, LEP			*							
Hispanic	73	82%	90	79%	76	80%	79	75%	89	82%
Hispanic, EconDis	74	76%	83	76%	65	82%	91	74%	72	79%
Hispanic, EconDis, LEP	64	72%	61	57%	60	88%	57	81%	55	55%
Hispanic, EconDis, SPED	4	75%	5	60%	4	50%	7	57%	11	64%
Hispanic, EconDis, SPED, LEP					*		3	100%	5	100%
Hispanic, LEP	23	52%	16	50%	21	81%	18	72%	14	36%
Hispanic, SPED	3	67%	6	50%	7	43%	10	60%	7	57%
Hispanic, SPED, LEP							*		*	
Other (or MultipleRace)	4	75%	5	80%	7	86%	8	75%	4	100%
Other (or MultipleRace), EconDis			*				*			
Other (or MultipleRace), EconDis, LEP			*		*		*			
Other (or MultipleRace), EconDis, SPED									*	
Other (or MultipleRace), LEP			*		*					
Other (or MultipleRace), SPED					*					
White	502	92%	522	95%	514	96%	512	96%	486	95%
White, EconDis	9	78%	12	100%	3	33%	6	83%	11	73%
White, EconDis, LEP	7	86%	5	100%	6	83%	8	88%	7	86%
White, EconDis, SPED	*		3	100%	*		*		*	
White, LEP	10	90%	10	100%	5	80%	11	100%	6	83%
White, SPED	41	73%	33	79%	34	85%	42	79%	60	75%
Total	1093	83%	1101	85%	1069	89%	1198	86%	1130	85%

*Results are not reported for groups of fewer than 3 students

Note: Each student is counted in one category based on the identified AYP reporting category applicable during the testing year.