

**Student Performance on the 10th-Grade WASL
in Spring 2006: Interim Report**

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December 2006

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WASHINGTON STATE INSTITUTE FOR PUBLIC POLICY

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Executive Summary

STUDY DIRECTION

The 2006 Legislature directed the Washington State Institute for Public Policy (Institute) to conduct a “review and statistical analysis of Washington assessment of student learning [WASL] data.”¹ The Institute was instructed to:

- Increase understanding of the students who did not meet the standard in one or more areas of assessment;
- Identify the characteristics of those students; and
- Identify possible barriers to student success on the WASL.

This interim report summarizes our research activities and findings to date, covering the following topics:

- WASL performance and high school graduation;
- 10th-grade WASL results from spring 2006;
- the implications of using different base populations in calculating WASL results;
- results of 10th-grade alternate assessments for special populations in spring 2006;
- associations among WASL subject-area results;
- WASL results by race/ethnicity;
- WASL strand-level results; and
- WASL performance by question format.

A final report is due in December 2007.

In addition to this report, two companion reports issued by the Institute will discuss research activities and preliminary findings to date for its analysis of (1) alternative assessment options for meeting high school graduation requirements and (2) the Promoting Academic Success program.

A HISTORIC LOOK AT THE WASL AND HIGH SCHOOL GRADUATION

The Institute’s analysis of the WASL began with an examination of the historical relationship between student performance on the WASL and subsequent graduation rates for the class of 2004, the most recent cohort for which both WASL and graduation data are available.

- The on-time graduation rate, defined as the percentage of students who graduate four years after entering the 9th grade, increased from 66 percent for the class of 2002 to 74 percent for the class of 2005.
- However, if the 10th-grade WASL had been a graduation requirement for the class of 2004, the graduation rate would have declined to approximately 36 percent.
- Graduates performed much better on the WASL than did non-graduates. Almost 42 percent of graduates met standard in all three content areas of the 10th-grade WASL (reading, writing, and math) compared with only 14 percent of 10th graders who did not subsequently graduate.

Over the past five years, more than one quarter of Washington’s 9th graders did not graduate within four years. Most of these non-graduates also performed below standard on the WASL.

TENTH-GRADE WASL IN SPRING 2006: SUMMARY RESULTS

Beginning with the class of 2008, students must meet standard in reading, writing, and math on the 10th-grade WASL to earn a Certificate of Academic Achievement, a prerequisite for graduation in Washington.² These students were slated to take the 10th-grade WASL in spring 2006.

- 85.7 percent of students who completed a reading assessment in spring 2006 met standard compared with 83.7 percent for writing and 54.1 percent for math.

¹ SSB 6618, Chapter 352, Laws of 2006.

² A recent news release describes a proposal to modify the graduation requirements, whereby students in the classes of 2008, 2009, and 2010 would be given the option of graduating without meeting standard on the WASL as long as they continue to take “rigorous” math classes. See: <http://www.governor.wa.gov/news/news-view.asp?pressRelease=392&newsType=1>.

- 53.6 percent of students met standard in all three subject areas, 29.0 percent met standard in any two subjects, 10.0 percent met standard in any one subject, and 7.4 percent did not meet standard in any subject.
- 20.5 percent of students were “far misses” (Level 1) in math; an additional 25.4 percent were “near misses” (Level 2).

HOW DIFFERENT BASE POPULATIONS AFFECT WASL RESULTS

Using different base student populations, the percentage of students who met standard on the WASL in spring 2006 varies by as much as 8.7 percent:

- As a percentage of students who were slated to take the WASL, 44.9 percent met standard.
- Excluding students with OSPI-approved exemptions, 50.5 percent met standard.
- As a percentage of students who completed an assessment, 53.6 percent met standard.
- Using guidelines established by the No Child Left Behind Act, 47.2 percent met standard.

When analyzing performance on the WASL, the Institute’s calculations use the number of students who completed all three subject areas: reading, writing, and math. When analyzing performance in a specific subject area such as math, the Institute uses the number of students who completed the subject-area assessment.

TENTH-GRADE ALTERNATE ASSESSMENTS FOR SPECIAL POPULATIONS

The Institute’s analysis of the WASL focuses on the “unmodified” assessment. However, students in special education with an Individualized Education Program (IEP) may be eligible to participate in one of three alternate assessments to the WASL:

- the WASL-Modified is identical to the unmodified WASL but sets the achievement standard at Level 2 (Basic) rather than Level 3 (Proficient);

- the Developmentally Appropriate WASL permits students to take a WASL for the grade level that most closely matches their developmental or instructional level; or
- the Washington Alternate Assessment System (WAAS) Portfolio option allows students to submit work samples in lieu of taking the pencil-and-paper WASL.

Students who meet state learning standards on these alternate assessments receive a Certificate of Individual Achievement, which is an approved pathway to a regular high school diploma.

A student’s IEP team determines which assessment he or she is eligible to take. The decision is based on the student’s developmental or instructional level. In spring 2006:

- 4.4 percent of 10th graders were slated to take an alternate assessment:
 - ✓ WASL-Modified, 0.5 percent;
 - ✓ WAAS-Portfolio, 0.6 percent;
 - ✓ Developmentally Appropriate WASL, 1.5 percent; and
 - ✓ Combination of alternatives, 1.8 percent.
- 78.3 percent of the students who were scheduled to take a WASL-Modified completed the assessment; 17.2 percent of these students met standard in all three subjects (reading, writing, and math).
- 94.3 percent of the students who participated in the WAAS-Portfolio option completed the assessment; 62 percent of these students met standard in all three areas.
- 90.1 percent of the students who were eligible for a developmentally appropriate WASL (WAAS-DAW) completed the assessment; 10 percent of these students met standard overall.

ASSOCIATIONS AMONG SUBJECT AREAS

Subject-area results on the unmodified 10th-grade WASL in spring 2006 are strongly associated, even though substantially more students met standard in reading and writing than in math.

With respect to performance in reading and math, the analysis finds that:

- Students who met standard in math almost always met standard in reading as well.

- Most students who did not meet standard in reading did not meet standard in math.
- However, meeting standard in reading did not guarantee that students would also meet standard in math, nor were below-standard math scores always associated with substandard performance in reading.

Thus, in most cases, meeting standard in reading is a necessary but insufficient condition for meeting standard in math.

With respect to performance in reading and writing, the analysis finds that:

- Most students who met standard in reading also met standard in writing, and vice versa.
- More than half of students with below-standard reading scores did not meet standard in writing; similarly, nearly half of students with below-standard writing scores did not meet standard in reading.

The relationship between writing and math is similar to that between reading and math.

In sum, the analysis suggests that students must be able to read in order to meet standard in writing and math, but the ability to read does not guarantee success in other subjects. Moreover, students who meet standard in math usually meet standard in reading and writing as well.

RESULTS BY RACE AND ETHNICITY

Using racial and ethnic categories established by the Office of Superintendent of Public Instruction, the percentage of 10th graders who met standard in all three subject areas of the WASL—reading, writing, and math—is as follows:

- 60.7 percent of Asian students,
- 58.4 percent of White students,
- 34.8 percent of American Indian students,
- 27.7 percent of Hispanic students, and
- 26.1 percent of Black students.

Performance on the WASL overall is driven largely by the percentage of students who met standard in math, which ranges from 27 percent of Black students to 63 percent of Asian students. On average, White students performed near the top of this range while American Indians and Hispanics performed near the bottom.

VARIABILITY IN STUDENT PERFORMANCE ON WASL STRANDS OVER TIME

Strands are subsets of test questions that correspond to different Essential Academic Learning Requirements (EALRs). The percentage of students who are proficient in reading and math strands varies considerably over time.

- The proficiency rate for each math strand fluctuates by as much as 21.5 percent from one year to the next.
- Likewise, the percentage of students who were proficient in each reading strand varies by as much as 21.2 percent from year to year.

This suggests that strand results in reading and math may not be reliable over time. Nevertheless, variability in strand-level results does not diminish the overall reliability of the WASL.

OPEN-ENDED AND MULTIPLE-CHOICE QUESTIONS

The reading and math assessments consist of two item formats:

- Multiple-choice questions require students to select one answer from a set of possible answers, whereas
- Open-ended questions require students to provide their own short-answer or extended responses.

Summative open-ended and multiple-choice scores are strongly correlated, especially for math. Students who do well on multiple-choice questions almost always do well on open-ended questions. Similarly, students who do well on open-ended questions also do well on multiple-choice questions.

These associations are stronger for math than for reading, which suggests that multiple-choice and open-ended questions assess similar kinds of skills in math, but less so for reading.

Achievement on open-ended questions and performance on the writing assessment of the WASL are also associated:

- 87 percent of students who did not meet standard in writing scored below the median on open-ended reading and math questions.
- Nearly 60 percent of students who met standard in writing scored above the median on open-ended reading and math questions.

Proficiency in writing therefore appears to be a necessary but not sufficient condition for achieving above-median scores on open-ended questions.

FUTURE RESEARCH

In future reports, the Institute will analyze in greater detail the characteristics of students who do not meet state learning standards in one or more subject-area assessments of the WASL, including the impact of socioeconomic characteristics on WASL performance. As part of its mandate to identify potential barriers to student success on the WASL, the Institute will also investigate school-level factors that may pose obstacles to meeting standard.

I. A HISTORIC LOOK AT THE WASL AND HIGH SCHOOL GRADUATION

We first examine the historical relationship between student performance on the 10th-grade Washington Assessment of Student Learning (WASL) and subsequent high school graduation.

Beginning with the high school class of 2008, students must meet standard in three subject areas—reading, writing, and math—to graduate. Student-level WASL data for 10th graders in the class of 2008 were not available when this analysis was conducted, and graduation data for the class of 2008 will not be available until the end of 2008.

The class of 2004 is the most recent cohort for which both WASL and graduation data are available.³ Since WASL performance continues to improve,⁴ this analysis provides a starting point to examine the relationship between student performance on the WASL and graduation rates.

It is important to emphasize that generalizations from this analysis to the class of 2008 cannot be made for these significant reasons:

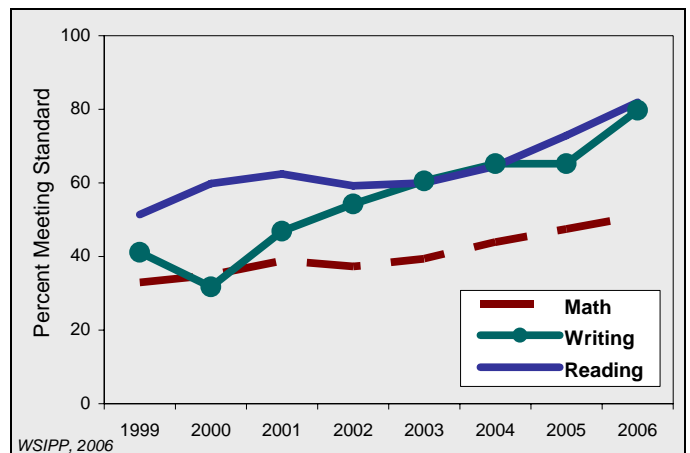
- Students in the class of 2008 have two additional years of instruction before graduation.
- Students can retake the WASL up to four times in each subject to meet standard.
- Districts have adopted curricula and classroom instructional practices that are more closely aligned with statewide learning standards.
- Targeted assistance programs, such as Promoting Academic Success, have been developed and offered to students.
- Meeting standard on the WASL is now a prerequisite for graduation.
- Alternative assessments are an option for meeting graduation requirements.

A HISTORY OF IMPROVING WASL PERFORMANCE AND GRADUATION RATES

Exhibit 1 plots the annual 10th-grade WASL performance in reading, writing, and math between 1999 and 2006.⁵

The proportions of students who met standard in reading and math have steadily increased. Nevertheless, the gap in the percentage of students meeting standard in reading versus math has persisted. In 2006, 82 percent of students met standard in reading while 51 percent met standard in math. The percentage of students who met standard in writing increased much more rapidly, from a low of 32 percent in 2000 to 80 percent in 2006.

Exhibit 1
Percentage of 10th Graders Meeting Standard in Reading, Writing, and Math, 1999–2006



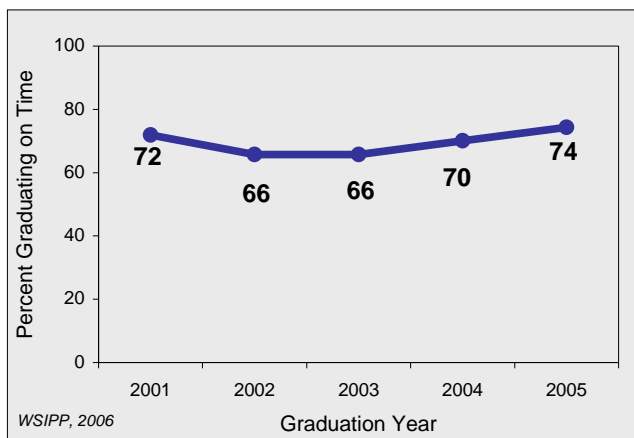
³ The class of 2005 graduation data were not available when this analysis was conducted. Since the WASL results and graduation rates for the class of 2004 and 2005 are similar, we are confident the findings apply to both classes.

⁴ See Exhibit 1.

⁵ <http://reportcard.ospi.k12.wa.us/waslTrend.aspx>

Exhibit 2 displays the “on-time” graduation rates from 2001 to 2005.⁶ These rates have increased from a low of 66 percent for the class of 2002 to 74 percent for the class of 2005.

Exhibit 2
On-Time Graduation Rates, 2001–2005



Exhibits 1 and 2 demonstrate improving student academic performance.

HOW WERE SUBJECT AREA WASL RESULTS RELATED TO GRADUATION RATES?

Exhibit 3 plots the percentage of students who graduated for each combination of subject-area results.⁷ Approximately half of students (55 percent) who did not meet standard in any subject area in 2002 graduated in 2004. These students accounted for 23 percent of the class of 2004.

In contrast to those who did not meet standard in any area, students who met standard in *one* content area graduated at a much higher rate, above 70 percent. These students accounted for 17 percent of the class.

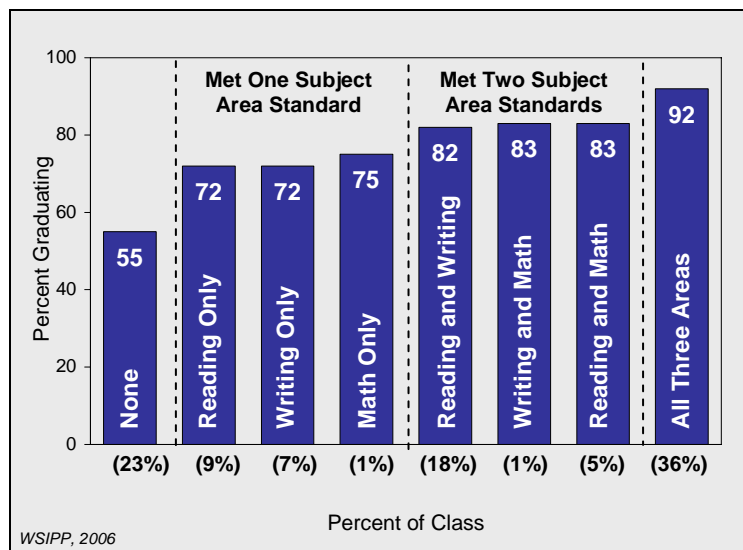
⁶ The percentage of students who began grade 9 and graduated “on time” four years later. The Office of Superintendent of Public Instruction (OSPI) began publishing these rates for the class of 2001. <http://reportcard.ospi.k12.wa.us/summary.aspx>

⁷ The sample includes all students who completed the 10th-grade WASL in 2002 and were expected to graduate by 2004. Of the 81,723 students enrolled in the 10th grade in 2002, 62,846 completed the three subject areas of the WASL. The graduation rate for this sample is higher than a typical 9th-grade on-time rate because some students drop out between the 9th and 10th grades, and because the students who did not complete the WASL had very low graduation rates.

Over 80 percent of students who met standard in *two* subject areas graduated. Altogether, 24 percent of students met standard in two content areas. Eighteen percent of the class met standard in reading and writing, but not math. Thirty-six percent of the class met standard in all three subject areas, and this group had the highest graduation rate—92 percent.

These results indicate that as students meet standard in more subject areas, their likelihood of graduating increases.

Exhibit 3
Percentage Completing 10th-Grade WASL in 2002 Who Graduated in 2004: Performance in Each WASL Subject Area



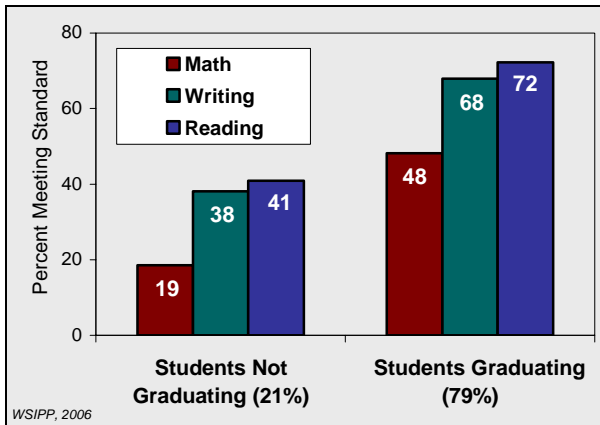
HOW DID GRADUATES AND NON-GRADUATES DO IN THE 10TH-GRADE WASL CONTENT AREAS?

Another way to examine these data is to review the performance of 2004 graduates on their 10th-grade WASL exams.

Exhibit 4 compares 10th-grade 2002 WASL performance for students who did and did not graduate in 2004. Graduates consistently outperformed non-graduates by approximately 30 percentage points in each of three content areas. Overall, 42 percent of graduates met standard in all three content areas, compared with only 14 percent of students who did not graduate.

Among graduating students, 72 percent met standard in reading, 68 percent met standard in writing, and 48 percent met standard in math.⁸

Exhibit 4
WASL Performance in 2002
by High School Graduation in 2004



Percentage of class is indicated in parentheses.

The results displayed in Exhibit 4 indicate that most graduates in 2004 were at the expected level of reading proficiency in the 10th grade. Slightly fewer graduates were at the expected writing level. Less than half were at the expected level of proficiency in math.

SUMMARY OF FINDINGS

These findings provide a starting point for examining the historical relationship between student performance on the WASL and graduation rates.

- The on-time graduation rate has increased from 66 percent for the class of 2002 to 74 percent for the class of 2005.
- The proportion of students meeting standard in reading, writing, and math has increased. Students meeting standard in reading and writing reached 80 percent in 2006, while only 51 percent of the students met standard in math.
- Approximately 36 percent of all students who completed the 10th-grade WASL in 2002 met standard in all three areas.
- Graduates performed much better on the WASL than did non-graduates. Almost 42 percent of graduates met standard in all three content areas in the 10th grade compared with only 14 percent who did not graduate.
- Among graduating students, 72 percent had met standard in reading by the 10th grade, 68 percent had met standard in writing, and 48 percent had met standard in math.

It is important to emphasize, however, that generalizations to the class of 2008 cannot be made from this analysis because of the multiple changes taking place in the education system.

Over the last five years, more than one quarter of Washington's 9th graders did not graduate within four years. Most of these non-graduates also performed poorly on the WASL. Students with characteristics similar to historic non-graduates will face significant challenges in meeting standard.

In the following sections of this report, we examine WASL performance for students in the class of 2008, for whom meeting standard is a graduation requirement.

⁸ When the reading results are disaggregated by reading level, 56 percent of graduates performed well above standard (Level 4) and 18 percent were one level below standard (Level 2). In contrast, only 21 percent of graduates scored well above standard in math and 25 percent were one level below standard.

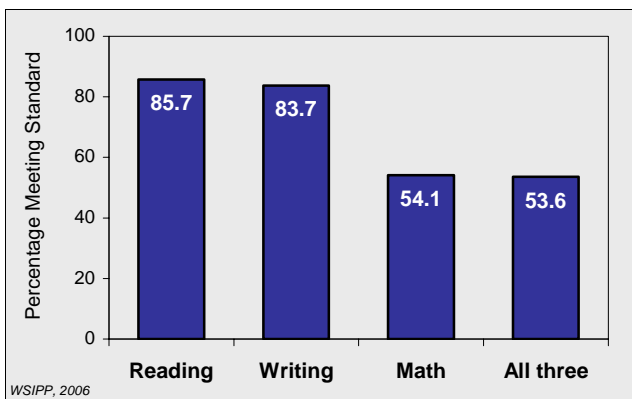
II. Tenth-Grade WASL in Spring 2006: Summary Results

Beginning with the class of 2008, students must meet standard in reading, writing, and math on the 10th-grade Washington Assessment of Student Learning (WASL) to earn a Certificate of Academic Achievement, a prerequisite for graduation in Washington.⁹

In this section we provide an overview of 10th-grade WASL results for spring 2006.

Records obtained from the Office of Superintendent of Public Instruction indicate that 65,362 10th graders completed the WASL in spring 2006.

Exhibit 5
Percentage of Students Meeting Standard on the 10th-Grade WASL in Spring 2006



The percentage of students who met standard in each subject area is presented in **Exhibit 5**. Meeting standard “reflects what a hard-working, well-taught student should know and be able to do to demonstrate mastery of the state’s Essential Academic Learning Requirements (EALRs).”¹⁰ Nearly 86 percent of students who completed a reading assessment in spring 2006

⁹ To graduate, students must also complete a culminating project, satisfy class credit requirements, and craft a High School and Beyond Plan. See: <http://www.k12.wa.us/graduationrequirements/GradRequirements.aspx>.

¹⁰ Office of Superintendent of Public Instruction, *Scale Scores for Levels on WASL Assessments*, <http://www.k12.wa.us/assessment/TestAdministration/pubdocs/PerformanceLevel_CutScores_NewStds.pdf>, August 2005.

met standard. A comparable proportion (83.7 percent) met standard in writing. In contrast, just over half met standard in math (54.1 percent). Due largely to their relatively low performance in math, only 53.6 percent of students met the necessary standard in all three subject areas of the WASL.

Exhibit 6 further illustrates student performance on the WASL by charting the percentage of students who met standard for each combination of subject areas. Again, 53.6 percent of test takers met standard in reading, writing, and math. A total of 26.9 percent met standard in reading and writing but not math. Likewise, a very small proportion of students—only 0.2 percent (n=125)—met standard in math but not reading or writing. This result suggests that students who are proficient in math tend also to be competent readers and writers. The converse, however, is not necessarily true: students proficient in reading or writing are not always proficient in math.

A much smaller proportion of students met standard in reading only (5.4 percent), writing only (4.4 percent), reading and math but not writing (1.7 percent), and writing and math but not reading (0.4 percent). Likewise, a very small proportion of students—only 0.2 percent (n=125)—met standard in math but not reading or writing. This result suggests that students who are proficient in math tend also to be competent readers and writers. The converse, however, is not necessarily true: students proficient in reading or writing are not always proficient in math.

An additional 7.4 percent of students did not meet standard in any subject.

Exhibit 6
Combinations of Subject-Area Results on the 10th-Grade WASL in Spring 2006

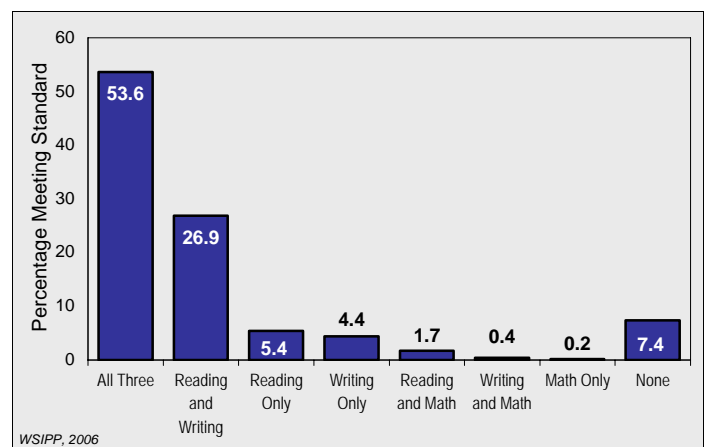


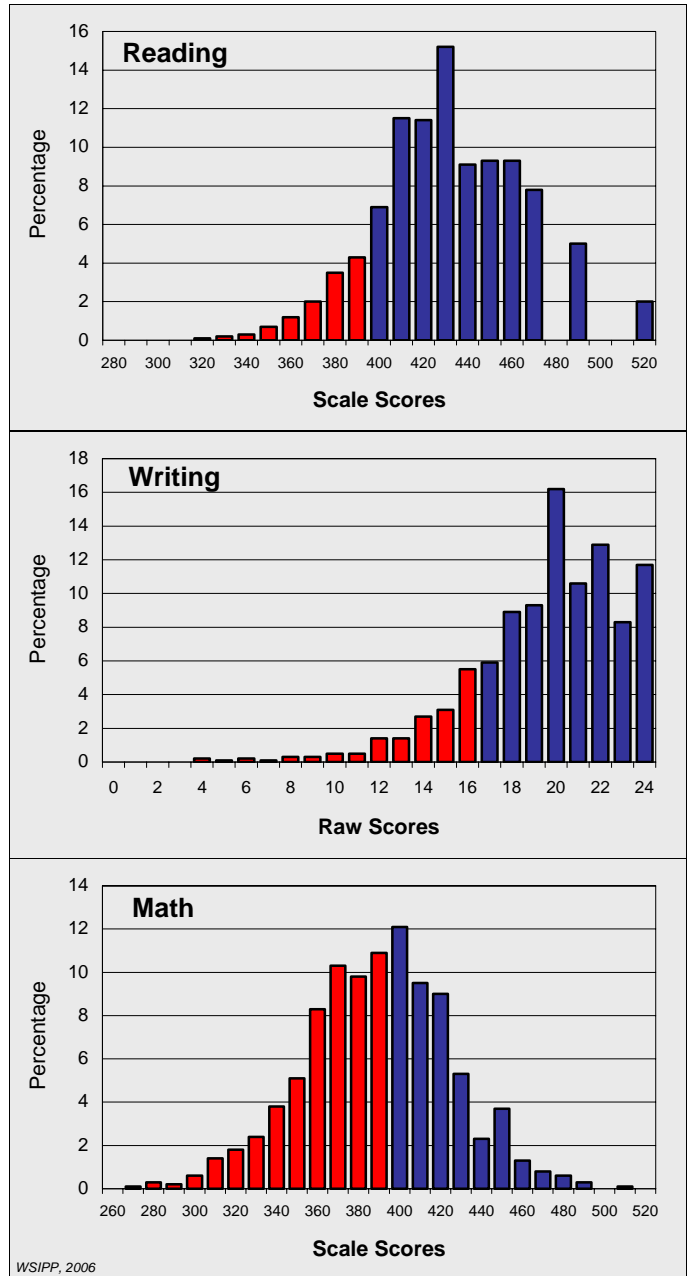
Exhibit 7 plots the distribution of scale scores in 10-point increments for reading and math, and the distribution of raw scores for writing. Students meet standard in reading and math when they achieve a score of 400 or greater, and writing when they receive at least 17 points. Red bars indicate below-standard scores and blue bars depict scores that meet or exceed standard.

Nearly half the bars for math are colored red, whereas the predominant color for reading and writing is blue. Put differently, the distribution of reading and writing scores is skewed—comparatively few students score below standard—while the distribution of math scores is roughly symmetrical.

How far from proficiency are students who do not meet standard in reading, writing, or math? Level 2 (Basic) scores range between 375 and 399 points for reading and math, and between 13 and 16 points for writing.¹¹ Level 1 (Below Basic) scores fall below these thresholds. Level 2 scores are characterized as “near misses,” whereas Level 1 scores are considered “far misses.”

As reported in **Exhibit 8**, 10.5 percent of students who took the reading WASL in spring 2006 received scores that were between 1 and 25 points below standard (i.e., Level 2). Approximately 3.4 percent of students were within 5 points of meeting standard, 5.8 percent were within 10 points, 7.8 percent were within 15 points, and 9.4 percent were within 20 points. An additional 3.8 percent of students were more than 25 points below standard (Level 1).

Exhibit 7
Distribution of Scores in Reading, Writing, and Math, 10th-Grade WASL, Spring 2006



¹¹ Standards and cut scores on the WASL were established by the Academic Achievement and Accountability (A+) Commission, based on recommendations from standard-setting committees for each content area and grade level.

The results for writing are comparable to those for reading. Fewer than 13 percent of students received a Level 2 in writing, while another 3.6 percent earned scores in the Level 1 range. Note that 5.5 percent of students missed proficiency in writing by only 1 point. However, it is important to remember that a 1-point difference on the condensed writing scale is much more significant than a similar difference on the reading and math scales.

A much larger percentage of students fell below standard in math: one in four (25.4 percent) were within 25 points of meeting standard, and an additional one in five (20.5 percent) received Level 1 scores. Nearly 12 percent of students missed standard in math by 10 or fewer points.

SUMMARY OF FINDINGS

Tenth-grade WASL results for spring 2006 are as follows:

- 85.7 percent of students who completed an assessment met standard in reading, 83.7 percent met standard in writing, and 54.1 percent met standard in math.
- 53.6 percent of students met standard in all three subject areas, 29.0 percent met standard in any two subjects, 10.0 percent met standard in any one subject, and 7.4 percent did not meet standard in any subject.
- 20.5 percent of students were “far misses” (Level 1) in math; an additional 25.4 percent were “near misses” (Level 2).

Meeting standard on the WASL became a graduation requirement for the class of 2008. As of spring 2006, nearly half of all students in the class of 2008 will not graduate unless their WASL scores, especially in math, can be improved. The Legislature appropriated funds for Promoting Academic Success (PAS) to provide extended learning activities for 10th grade students who did not meet state learning standards on the spring 2006 WASL. In addition, students now have the opportunity to retake the WASL up to four times in each subject.

Exhibit 8
“Near” and “Far” Misses in Reading, Writing, and Math, 10th-Grade WASL, Spring 2006

Points Below Standard		Reading	
		Percentage	Cumulative Percentage
Level 2	1–5	3.4%	3.4%
	6–10	2.4%	5.8%
	11–15	2.0%	7.8%
	16–20	1.6%	9.4%
	21–25	1.1%	10.5%
Level 1	More than 25	3.8%	14.3%

Points Below Standard		Writing	
		Percentage	Cumulative Percentage
Level 2	1	5.5%	5.5%
	2	3.1%	8.6%
	3	2.6%	11.2%
	4	1.5%	12.7%
Level 1	More than 4	3.6%	16.3%

Points Below Standard		Math	
		Percentage	Cumulative Percentage
Level 2	1–5	7.5%	7.5%
	6–10	4.4%	11.9%
	11–15	4.2%	16.1%
	16–20	5.7%	21.8%
	21–25	3.6%	25.4%
Level 1	More than 25	20.5%	45.9%

III. How Different Base Populations Affect WASL Results

A basic indicator of student performance on the Washington Assessment of Student Learning (WASL) is the percentage of students who meet standard. This percentage can vary depending on which students are included in the calculation.

This section describes the different ways to calculate the “met standard” rate.

In particular, we compare the percentage of 10th-grade students who met standard in spring 2006 based on students:

- slated to take the WASL (“slated”),¹²
- without exemptions approved by the Office of Superintendent of Public Instruction (“OSPI exemptions”),
- who completed the WASL (“completers”), and
- using guidelines established by the No Child Left Behind Act (“NCLB exemptions”).

Exhibit 9 identifies the different categories of students included in each method of computing met standard rates.

Depending on the choice of base population denominators, the percentage of 10th graders who met standard in each content area of the WASL in spring 2006 varies by as much as 8.7 percent.

SLATED STUDENTS AND COMPLETERS

Records obtained from OSPI indicate that 78,020 students were slated to take the WASL in spring 2006; 83.8 percent (n=65,362) of these students completed all three content areas. An additional 3,595 students, or 4.4 percent of all 10th graders, were eligible to participate in an alternative assessment reserved for special education students with an Individualized Education Program (IEP). Section IV focuses on this population.¹³

Overall, 12,658 students slated to take the WASL did not complete all three subject areas. The details by subject area are reported in **Exhibit 10**.

Exhibit 9
Categories of Students Included in Different Calculations of Met Standard Rates

Categories of Students	Denominators			
	Slated	Completers	OSPI	NCLB
Completed Unmodified WASL	✓	✓	✓	✓
Took Alternate Assessment				✓
Excused Absences	✓			
Partial Enrollment	✓			✓
Previously Passed WASL	✓			
English Language Learner	✓			
Medical Exemption	✓			
Unexcused Absence	✓		✓	✓
Incomplete/Not Tested	✓		✓	✓
Student Refusal	✓		✓	✓
Invalidated Assessment	✓		✓	✓

Exhibit 10
10th Graders Who Completed and Did Not Complete the WASL, by Subject Area, Spring 2006

Subject	Slated Students	Completed		Not Completed	
		Number	Percentage	Number	Percentage
Reading	78,787	70,922	90.0%	7,865	10.0%
Writing	78,647	70,461	89.6%	8,186	10.4%
Math	78,600	69,803	88.8%	8,797	11.2%
All Three	78,020	65,362	83.8%	12,658	16.2%

¹² “Slated students” consist of 10th graders who were assigned a WASL booklet.

¹³ Alternate assessments will also be included in our computation of the percentage of students who met standard according to the No Child Left Behind Act.

OSPI EXEMPTIONS

Exhibit 11 displays the number of students who did not complete an assessment by subject and their reasons, categorized by whether the reasons are “approved” (and hence exempt) or “not approved” by OSPI.

When calculating the percentage of students who meet standard on the WASL, OSPI excludes students who were not tested due to excused absences or one of the following exemptions: partial enrollment, previously passed, first-year English language learner (ELL), and medical.¹⁴

For example, Exhibit 11 indicates that a plurality of students who did not complete the WASL—32.6, 31.9, and 32.6 percent for reading, writing, and math, respectively—had an excused absence. Unexcused absences, which do not constitute an OSPI-approved exemption, account for an additional 17 to 18 percent of incomplete assessments.

Exhibit 11
Reasons for Not Completing the WASL in Spring 2006

	Reading (n=7,865)	Writing (n=8,186)	Math (n=8,797)
Approved by OSPI			
Absent Excused	32.6%	31.9%	32.6%
Partially Enrolled	21.3%	20.2%	20.7%
Previously Passed Exemption	4.6%	3.7%	1.5%
ELL Exemption	3.2%	3.1%	3.0%
Medical Exemption	0.1%	0.1%	0.1%
Sub-total	61.8%	59.0%	57.9%
Not Approved by OSPI			
Absent Unexcused Not Tested	18.0%	17.3%	17.7%
No Booklet Not Tested	9.9%	10.2%	10.3%
Incomplete Not Tested	7.6%	10.0%	10.0%
Refused Not Tested	2.6%	3.3%	3.7%
Invalidated Not Tested*	0.2%	0.3%	0.4%
Sub-total	38.3%	41.1%	42.1%

* Reasons for invalidation include cheating, test disruption, and improper test administration.

¹⁴ Whether an absence is classified as excused or unexcused is regulated by policies developed by individual school districts. See: <http://reportcard.ospi.k12.wa.us/WASLCurrent.aspx?schooldd=1&reportLevel=State&year=2005-06&gradeLevel=10>. (RCW 28A.225.020)

FEDERAL GUIDELINES: NO CHILD LEFT BEHIND

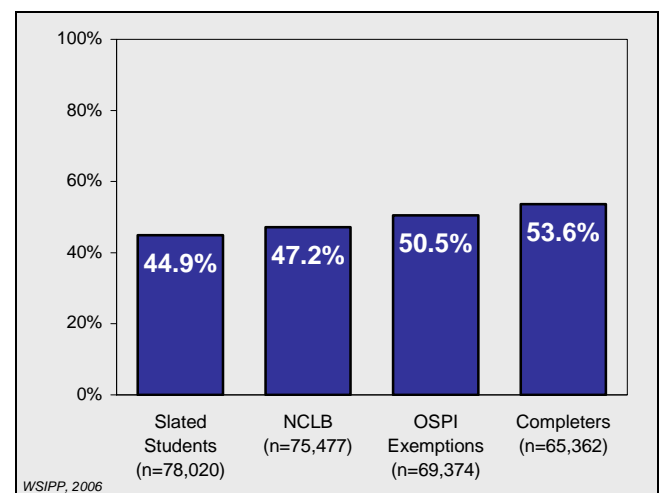
Federal guidelines prescribe yet another method for evaluating student performance on the WASL. The No Child Left Behind Act of 2001 (NCLB) establishes specific criteria for calculating the percentage of students who meet state achievement standards. As applied to Washington State, these calculations must include students who participate in alternate assessments for special populations (i.e., the WASL-Modified or Washington Alternative Assessment System), but exclude first-year English language learner (ELL) students, students with OSPI-approved medical exemptions, and students with excused absences.¹⁵

COMPARING MET STANDARD RATES ON WASL

Exhibit 12 illustrates how these four denominators produce different results. For example, when basing the results on all students slated to take the WASL in spring 2006, 44.9 percent met standard in all three subject areas.

Basing the results on students who completed all three subject areas produces the highest met standard rate, whereas results based on all students who were slated to take the WASL produce the lowest rate. There is an 8.7 percentage point difference between these methods.

Exhibit 12
Meeting Standard on the 10th-Grade WASL as Percentage of All and Tested Students, Spring 2006



¹⁵ For information about federal guidelines as they apply to Washington State, see Office of Superintendent of Public Instruction, “AYP Questions and Answers,” August 2006. See: http://www.k12.wa.us/ESEA/pubdocs/AYPFAQ_August0906.doc

Exhibit 13 demonstrates how the use of different denominators to calculate met-standard rates affects subject-area results on the WASL. The denominators for these calculations are based on the number of students for each subject area. For example, the percentage of students who met standard in reading varies between 77.1 percent for all 10th graders who were slated to take the reading assessment and 85.7 percent for students who completed the reading assessment.

As with the overall met standard rates, basing the results on students who completed each subject area assessment produces the highest met standard rate, whereas results based on students who were slated to take the subject area produce the lowest rate.

Pursuant to the Institute’s mandate to identify (1) the characteristics of students who did not meet standard on the WASL and (2) possible barriers to their lack of success,¹⁶ our focus is on students who take and complete the WASL. As such, the Institute reports the number of students who met standard on the WASL as a percentage of students who completed an assessment.

SUMMARY OF FINDINGS

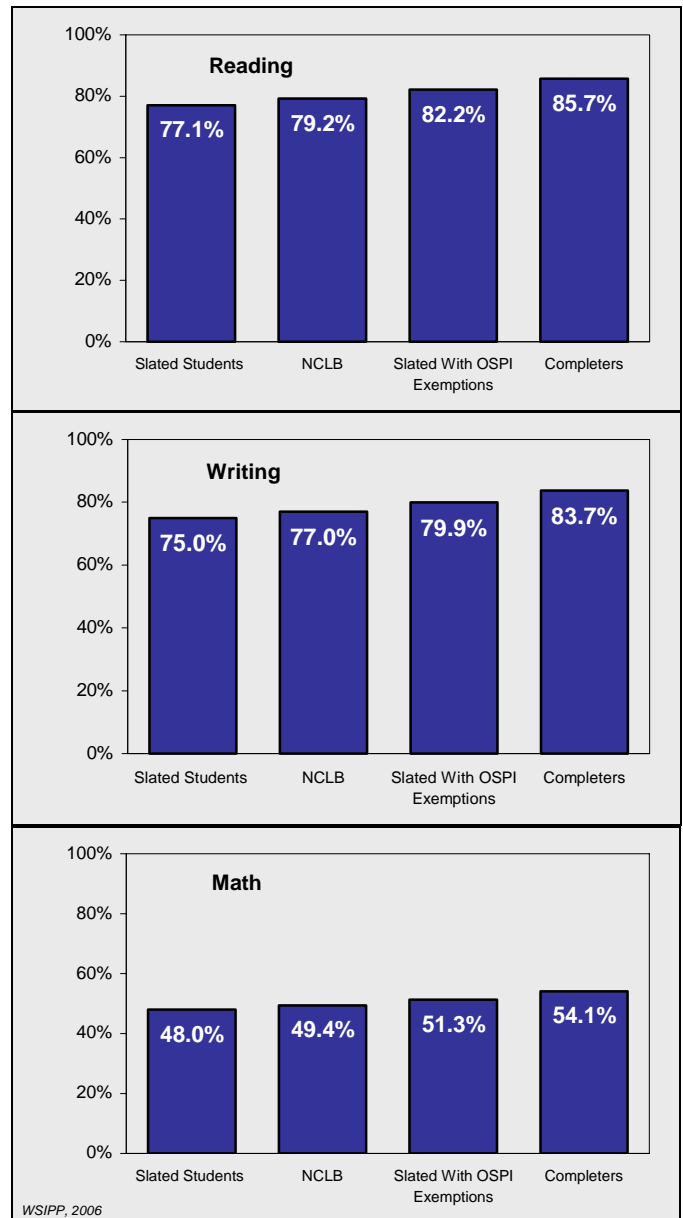
Using different base student populations, the percentage of 10th graders who met standard on the WASL in spring 2006 is as follows:

- As a percentage of students who were slated to take the WASL, 44.9 percent met standard.
- Excluding students with OSPI-approved exemptions, 50.5 percent of students met standard.
- As a percentage of students who completed an assessment, 53.6 percent met standard.
- Using guidelines established by the No Child Left Behind Act, 47.2 percent of students met standard.

When analyzing the relationships between performance on the WASL and student characteristics, the Institute’s calculations use the number of students who completed all three WASL subject areas.

When analyzing performance in a specific subject area, such as math, the Institute uses the number of students who completed the subject area test.

Exhibit 13
Meeting Standard on the 10th-Grade WASL as a Percentage Based on Different Denominators, by Subject Area



¹⁶ SSB 6618, Chapter 352, Laws of 2006.

IV. Tenth-Grade Alternate Assessments for Special Populations

Most students must now meet standard on the 10th-grade Washington Assessment of Student Learning (WASL) to graduate from public schools in Washington State. A student in special education with an Individualized Education Program (IEP) may participate in the state assessment system in the following ways:

- the “unmodified” WASL;
- the WASL-Modified; or
- the Washington Alternate Assessment System (WAAS), which consists of two options:
 - ✓ Developmentally Appropriate WASL (WAAS-DAW), or
 - ✓ WAAS-Portfolio.¹⁷

In spring 2006, 3,595 students (4.4 percent of all 10th-grade students) were scheduled to participate in one of these alternate assessments.

Tenth-grade students who meet state learning standards on the WASL-Modified or WAAS receive a Certificate of Individual Achievement. Students who meet standard on the unmodified WASL earn a Certificate of Academic Achievement. Both certificates are approved pathways to a regular high school diploma.

This section describes the use of alternate assessments in spring 2006.

Alternate assessments for special populations are an important component of the Washington State Assessment System, as they give students with IEPs the opportunity to graduate and are also included in the federal government’s appraisal of Adequate Yearly Progress under the No Child Left Behind Act of 2001.¹⁸

A student’s IEP team determines whether he or she is able to participate in the WASL. The decision for a student to participate in the WASL-Modified or WAAS must be based on the unique needs of the individual student, not a specific disability.

The WASL-Modified is administered to students with IEPs who perform at or near grade level and who are able to take paper-and-pencil tests under routine conditions. The WASL-Modified is identical to the unmodified WASL but sets the achievement standard at Level 2 (Basic) rather than Level 3 (Proficient).

The WAAS-Portfolio is reserved for students with significant cognitive disabilities who are unable to take paper-and-pencil tests, even with accommodations. These students submit samples of their work for review.

The Developmentally Appropriate WASL (WAAS-DAW) is intended for students whose performance is substantially below grade level. Students take a WASL for the grade level that most closely matches their developmental or instructional level. The WAAS-DAW may only be used for content areas in which the student receives special education services.¹⁹

STUDENTS SLATED TO TAKE EACH TYPE OF ASSESSMENT

Exhibit 14 illustrates the distribution of students across different assessment types.

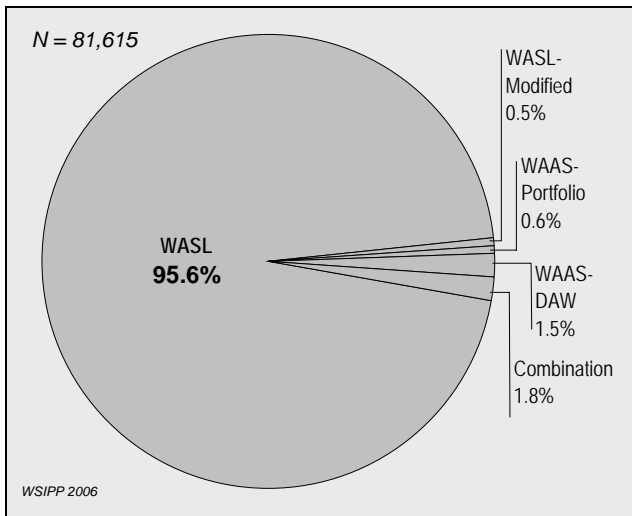
- Of the 81,615 10th graders enrolled in Washington’s public schools in spring 2006, the overwhelming majority—nearly 96 percent—were scheduled to take the unmodified WASL.
- Only 0.5 percent of students (n=401) were eligible for the WASL-Modified.
- Less than 1 percent of students (n=455) were slated for the WAAS-Portfolio option.
- An additional 1.5 percent of 10th graders (n=1,248) were eligible for the WAAS-DAW.
- Approximately 2 percent (n=1,491) were slated for some combination of alternate assessments.

¹⁷ ESHB 2195, Chapter 19, Laws of 2004

¹⁸ See Section III for a discussion of how different base populations affect WASL results.

¹⁹ In most cases, English language learner (ELL) students who receive second language support services are expected to participate in the unmodified WASL. T. Bergeson, C. Davidson, and J. Willhoft. (2006). *Guidelines for Participation and Testing Accommodations for Special Populations in State Assessment Programs*. Olympia: Office of Superintendent of Public Instruction.

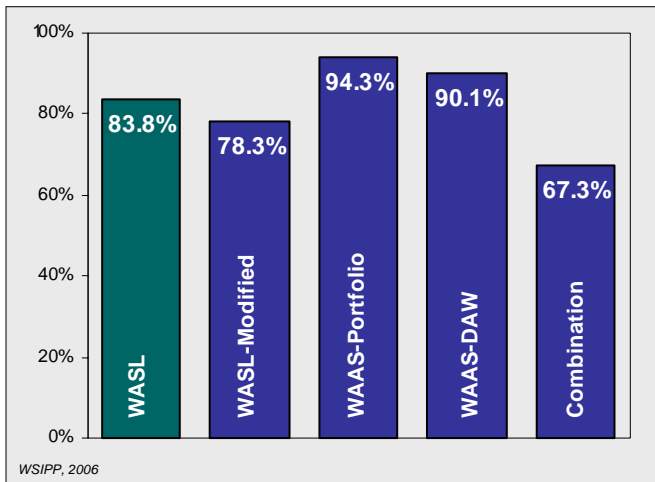
Exhibit 14
Percentage of 10th Graders by Type of Assessment, Spring 2006



COMPLETION RATES BY ASSESSMENT TYPE

Exhibit 15 shows that not every 10th grader completed an assessment as scheduled in spring 2006. Depending on which assessment students were slated to take, 67.3 to 94.3 percent completed all three reading, writing, and math subject-area assessments. Appendix A describes the reasons students did not complete an alternate assessment, and also reports the number and percentage of students who completed each type of alternate assessment by subject area.

Exhibit 15
Percentage of 10th Graders Completing an Assessment, Spring 2006



Note: "Combination" refers to a combination of alternate assessments (WAAS-Portfolio, WAAS-DAW, and WASL-Modified).

MET-STANDARD RATES BY ASSESSMENT TYPE

Exhibit 16 displays the percentage of 10th graders who met standard in all three subject areas on each type of assessment in spring 2006. Sixty-two percent who completed the WAAS-Portfolio met standard, while the rates for other alternate assessments were much lower. In comparison, 53.6 percent of 10th graders who completed the unmodified WASL met standard in reading, writing, and math.

Overall, 83.6 percent of 10th-grade students completed either the unmodified WASL or an alternate assessment in 2006 and slightly more than half—52.2 percent—met standard in all three subject areas.

Exhibit 17 provides a more detailed portrait of student performance on alternate assessments by charting the percentage of students who met standard by content area.

- For the WASL-Modified, students were more than three times as likely to meet standard in reading and writing as in math.
- Students who completed the WAAS-Portfolio met standard in reading and writing at rates comparable to the WASL-Modified; however, a much larger percentage met standard in math.
- Student performance was lowest for the WAAS-DAW—less than half of students met standard in reading and writing and one-fifth met standard in math.

Given the diverse nature of these alternate assessments and the fact that they are administered to different categories of students, the variation depicted in Exhibit 17 is to be expected.

Exhibit 16
Percentage of 10th Graders Meeting Standard in Three Subject Areas by Type of Assessment, Spring 2006

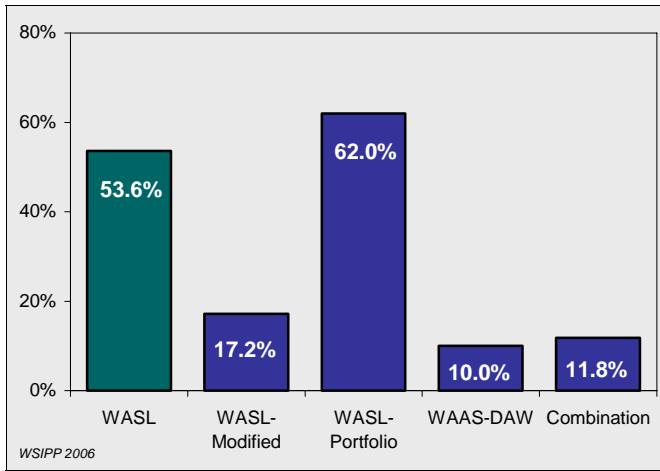
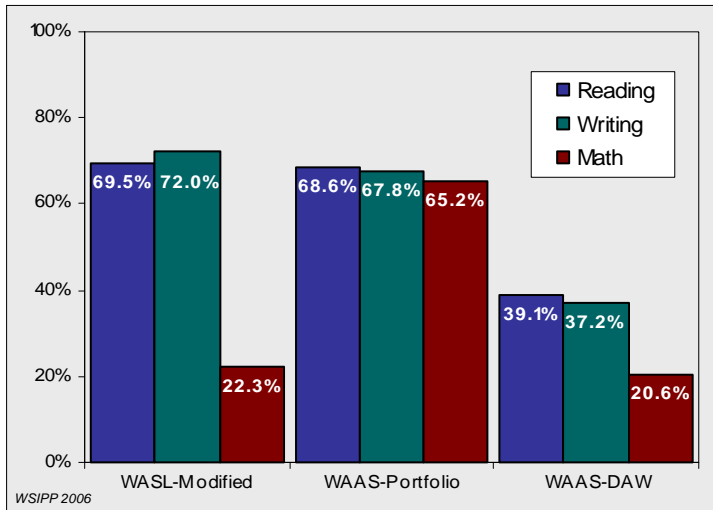


Exhibit 17
Percentage of 10th Graders Meeting Standard in Reading, Writing, and Math by Type of Assessment, Spring 2006



SUMMARY OF FINDINGS

Results of alternate assessments to the 10th-grade Washington Assessment of Student Learning (WASL) for special populations in spring 2006 are as follows:

- 4.4 percent of 10th graders were slated to take an alternate assessment in spring 2006:
 - ✓ WASL-Modified, 0.5 percent
 - ✓ WAAS-Portfolio, 0.6 percent
 - ✓ WAAS-DAW, 1.5 percent
 - ✓ Combination of alternatives, 1.8 percent
- 78.3 percent of the students who were scheduled to take a WASL-Modified completed the assessment; 17.2 percent of these students met standard in all three subjects (reading, writing, and math).
- 94.3 percent of the students who participated in the WAAS-Portfolio option completed the assessment; 62 percent of these students met standard in all three areas.
- 90.1 percent of the students who were eligible for a developmentally appropriate WASL (WAAS-DAW) completed the assessment; 10 percent of these students met standard overall.

A student's Individualized Education Program (IEP) team determines which assessment he or she is eligible to take. The decision is based on the student's developmental or instructional level.

V. ASSOCIATIONS AMONG SUBJECT AREAS

In this section, we describe associations among subject-area results for the 78,020 10th-grade students who completed the WASL in spring 2006.

The analysis finds that the associations among subject-area results on the WASL are strong even though more 10th graders met standard in reading and writing than in math.

ASSOCIATIONS AMONG SUBJECT-AREA SCORES

As might be expected, students who do well in one subject typically do well in others. One method for examining associations among subject-area WASL results is to perform a correlational analysis.

Exhibit 18 presents correlations among reading, writing, and math scores.

Exhibit 18
Correlations Among Subject-Area Scores on the Spring 2006 WASL

	Reading	Writing
Writing Score	0.64	—
Math Score	0.69	0.62

Correlations measure the degree of linear association between scores. The statistic ranges between -1.0 and +1.0, where 0.0 represents no association and ± 1.0 indicates a perfect linear association. By convention, correlations above 0.50 are considered to be strong.²⁰

Each correlation between subject-area results surpasses 0.60. That is, students with high or low scores in one subject tend to have correspondingly high or low scores in other subjects. The strongest correlation is between reading and math scores.

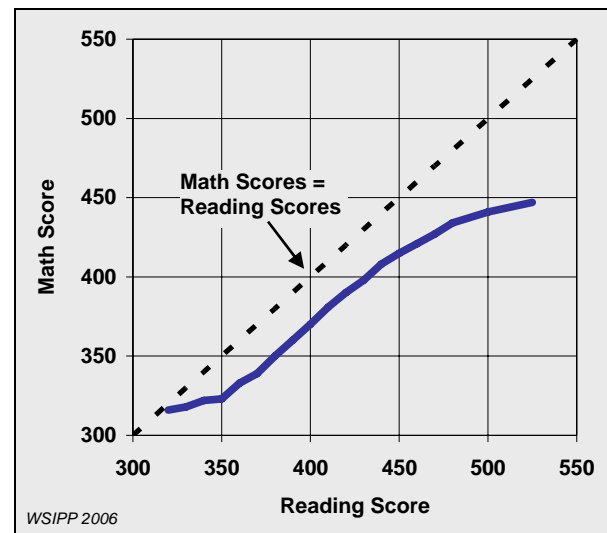
The ensuing analyses explain how subject-area scores can be strongly correlated and yet more students met standard in reading and writing than in math.

RELATIONSHIP BETWEEN READING AND MATH SCORES

Exhibit 19 demonstrates that, although math and reading scores are strongly correlated—that is, the relationship is roughly linear—reading scores consistently exceed math scores. The solid line plots average math scores for each reading score. The dashed line serves as a reference: for points falling below this line, average math scores are lower than average reading scores.

For example, among students with a reading score of 400,²¹ the average math score is 370. On average, math scores increase 7.6 points for every 10-point increase in reading scores. Put differently, student performance in math does not keep pace with performance in reading.²² All points fall below the dashed line, indicating that average reading scores always exceed average math scores.

Exhibit 19
Average Math Scores Given Reading Scores on the Spring 2006 WASL



²⁰ Jacob Cohen. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Hillsdale, NJ: Lawrence Erlbaum.

²¹ 400 is the “cut score” for meeting standard in reading and math.

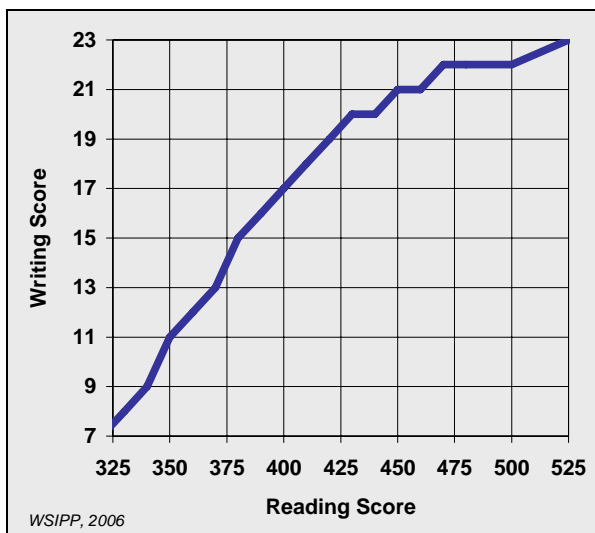
²² For students with a reading score of 400, the “middle half” of math scores—that is, scores that fall between the 25th and 75th percentiles—ranges between 353 and 385 points, a 32 point spread. This variation in math scores increases as reading scores increase.

RELATIONSHIP BETWEEN READING AND WRITING SCORES

Exhibit 20 shows that student performance in writing keeps pace with performance in reading until reading scores reach 450, at which point the slope declines appreciably.²³ Nevertheless, on average, a 10-point increase in reading scores is associated with a 0.6-point increase in writing scores—a noteworthy relationship given that writing scores range from 0 to 24 points, while reading scores vary between 225 and 550 points.

The average writing score for students with a reading score of 400 is 17 points. Incidentally, students meet standard in reading when they achieve a score of 400 or higher, and in writing with a score of 17 or higher.²⁴

Exhibit 20
Average Writing Scores Given Reading Scores
on the Spring 2006 WASL



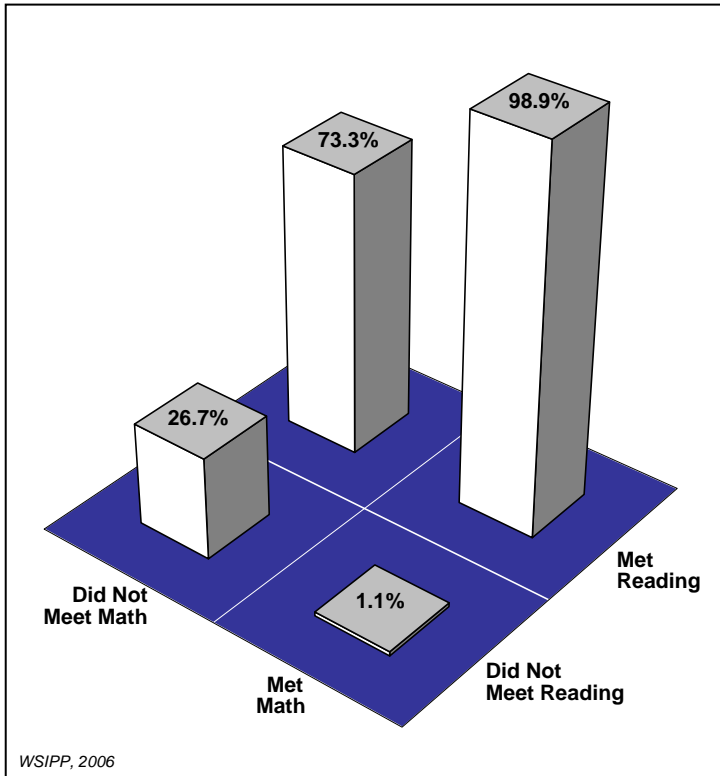
A correlational analysis explains only part of the story—it shows the association between subject-area scores, but makes it difficult to compare students who met standard in one subject but not in others. Reading and math scores are correlated, for instance, even though a substantially higher percentage of students met standard in reading than in math.²⁵

²³ This may be partially attributable to a ceiling effect, as raw writing scores do not exceed 24.

²⁴ http://www.k12.wa.us/Assessment/TestAdministration/pubdocs/PerformanceLevel_CutScores2006WASL.pdf

²⁵ For met standard rates, see Section II.

Exhibit 21a
Percentage Meeting Standard in Reading Given
Performance in Math on the Spring 2006 WASL



Explaining the relationships between subject-area results in terms of meeting standard requires a different kind of analysis.

RELATIONSHIP BETWEEN MEETING STANDARD IN READING AND MATH

Exhibits 21a and 21b illustrate the relationship between meeting standard in reading and math:

- Students who met standard in math almost always met standard in reading as well.
- Most students with below-standard reading scores also scored below standard in math.
- Students who met standard in reading did not necessarily meet standard in math.
- The majority of students with below-standard math scores nevertheless met standard in reading.

Exhibit 21a displays the percentage of students who met standard in reading given their performance in math:

- 98.9 percent of students who met standard in math also met standard in reading.²⁶
- 73.3 percent of students who did not meet standard in math met standard in reading. As such, 26.7 percent of students who did not meet standard in math also had below-standard reading scores.

Exhibit 21b
Percentage Meeting Standard in Math Given
Performance in Reading on the Spring 2006 WASL

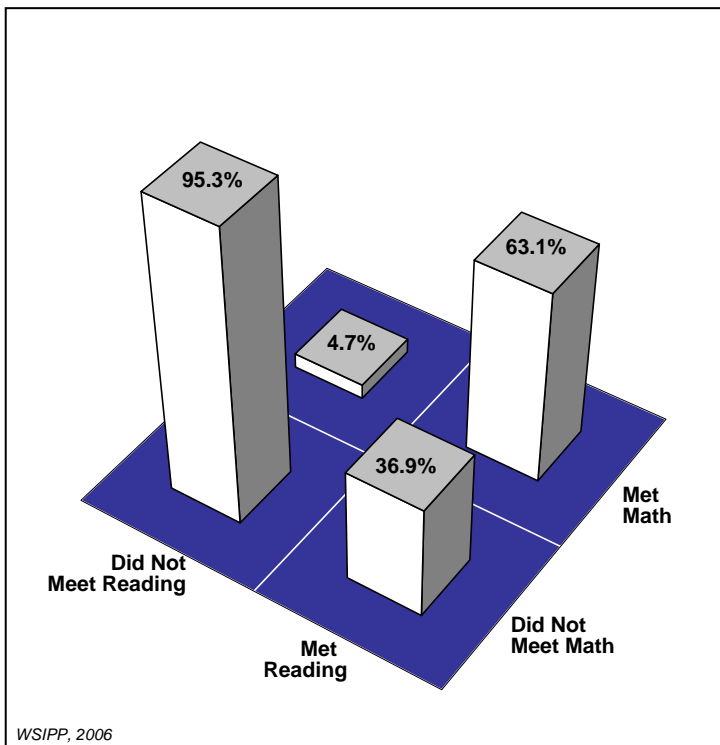


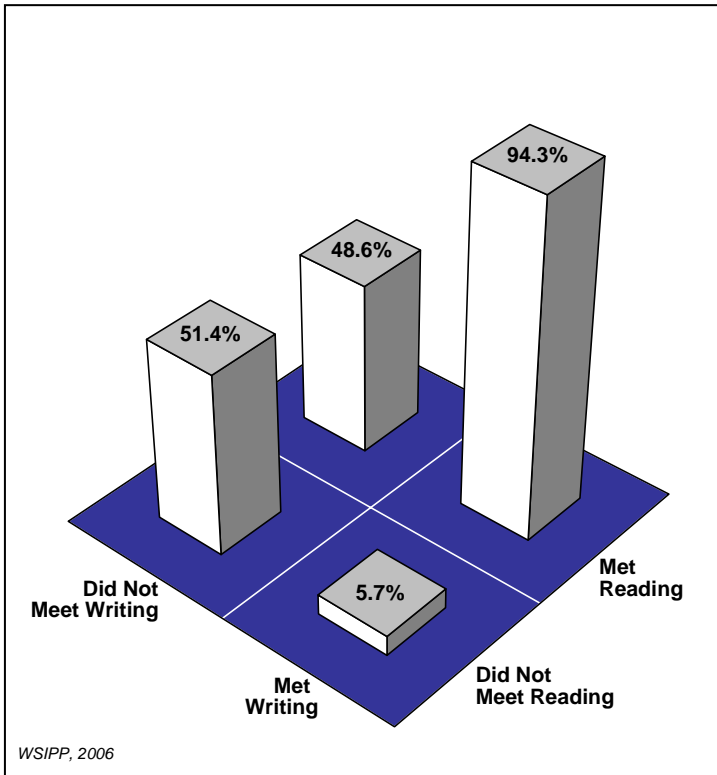
Exhibit 21b charts the percentage of students who met standard in math given their performance in reading:

- 63.1 percent of students who met standard in reading also met standard in math. Put differently, 36.9 percent of students who met standard in reading did not meet standard in math.
- Conversely, 95.3 percent of students with below-standard reading scores did not meet standard in math.

Appendix B replicates this analysis by performance levels—Level 1 through Level 4.

²⁶ Note that column totals (“Met Math” and “Did Not Meet Math”) sum to 100 percent, such that a corresponding 1.1 percent of students who met standard in math did not meet standard in reading.

Exhibit 22a
Percentage Meeting Standard in Reading Given
Performance in Writing on the Spring 2006 WASL



RELATIONSHIP BETWEEN MEETING STANDARD IN READING AND WRITING

Exhibits 22a and 22b illustrate the relationship between meeting standard in reading and writing:

- Most students who met standard in writing also met standard in reading.
- Similarly, most students who met standard in reading also met standard in writing.
- Approximately half of students who did not meet standard in writing performed below standard in reading.
- More than half of students who did not meet standard in reading also received below-standard scores in writing.

Exhibit 22a depicts the percentage of students who met standard in reading given their performance in writing:

- 94.3 percent of students who met standard in writing also met standard in reading. This means that only 5.7 percent of students who met standard in writing performed below standard in reading.
- Slightly less than half (48.6 percent) of students who did not meet standard in writing, met standard in reading. Correspondingly, just over half (51.4 percent) of the students who did not meet standard in writing also performed below standard in reading.

Exhibit 22b
Percentage Meeting Standard in Writing Given
Performance in Reading on the Spring 2006 WASL

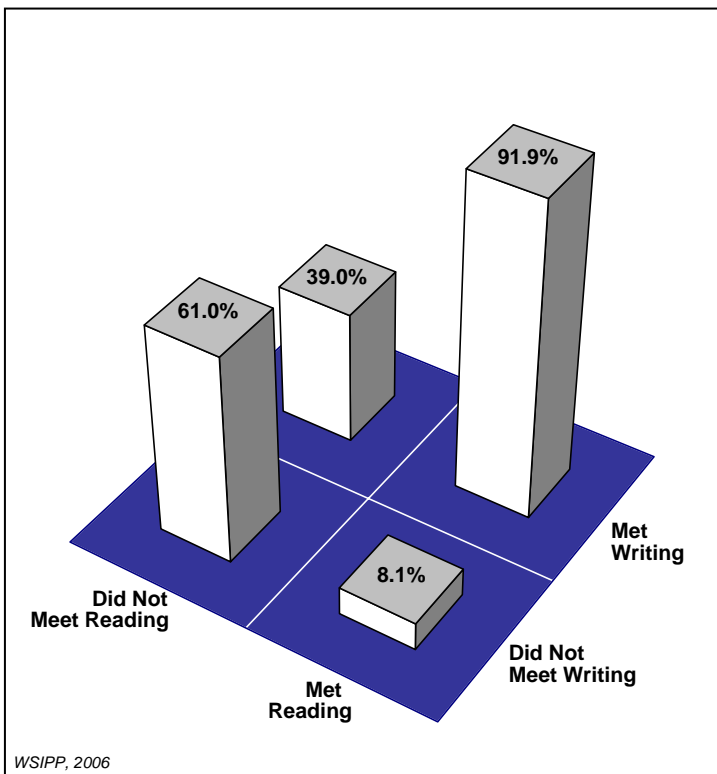


Exhibit 22b displays aggregate student performance in writing given performance in reading:

- 91.9 percent of students who met standard in reading also met standard in writing.
- 61 percent of the students who did not meet standard in reading also performed below standard in writing. Put another way, 39 percent of students met standard in writing despite below-standard performance in reading.

SUMMARY OF FINDINGS

With respect to performance in reading and math on the 10th-grade WASL in spring 2006, the analysis finds that:

- Students who met standard in math almost always met standard in reading as well.
- Most students who did not meet standard in reading did not meet standard in math.
- However, meeting standard in reading did not guarantee that students would also meet standard in math, nor were below-standard math scores always associated with substandard performance in reading.

Thus, in most cases, meeting standard in reading is a necessary but insufficient condition for meeting standard in math.

With respect to performance in reading and writing, the analysis finds that:

- Most students who met standard in reading also met standard in writing, and vice versa.
- On average, more than half of students with below-standard reading scores did not meet standard in writing; similarly, nearly half of students with below-standard writing scores did not meet standard in reading.

The relationship between writing and math is similar to that between reading and math.

In sum, the analysis suggests that students must be able to read in order to meet standard in writing and math, but the ability to read does not guarantee success in other subjects. Moreover, students who meet standard in math usually meet standard in reading and writing as well.

VI. Results by Race and Ethnicity

In this section, we summarize results of the 10th-grade WASL in spring 2006 by the racial/ethnic characteristics of students.

We adopt racial/ethnic categories and terminology used by the Office of Superintendent of Public Instruction (OSPI):

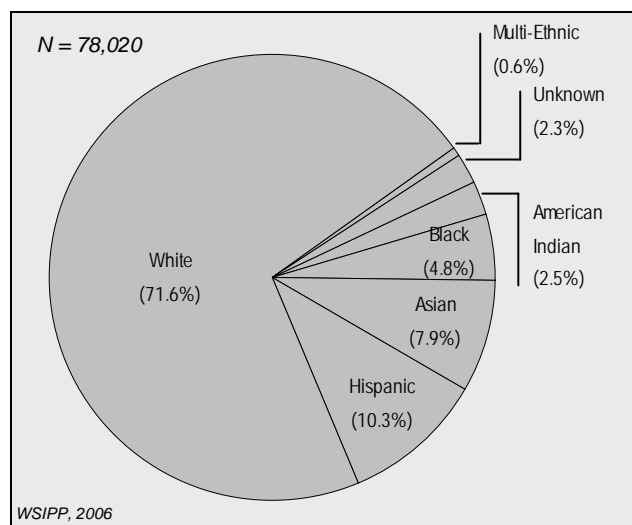
- American Indian: American Indian or Alaska Native;
- Asian: Asian, Native Hawaiian, or Pacific Islander;
- Black: Black or African American;
- Hispanic: Hispanic or Latino/a; and
- White: Caucasian or White.²⁷

RACIAL/ETHNIC COMPOSITION OF STUDENTS WHO WERE SLATED TO TAKE THE WASL

Exhibit 23 shows that nearly 72 percent of the 78,020 10th-grade students who were slated to take the unmodified WASL in spring 2006 were White. Hispanic students constituted the largest non-White group, followed by Asians, Blacks, American Indians, and students with multiple ethnic identities. Racial/ethnic identities were unknown for 2.3 percent of students.

Exhibit 23

Percentage of 10th Graders Slated to Take the WASL in Spring 2006 by Race/Ethnicity



²⁷ Office of Superintendent of Public Instruction, Core Student Record System: Monthly Collection Data Manual for the 2006–2007 School Year. (May 2006). Olympia, WA: Office of Superintendent of Public Instruction, p. 56.

COMPLETING THE WASL BY RACE/ETHNICITY

Exhibit 24 displays the percentage of students who completed the 10th-grade WASL in spring 2006 by race/ethnicity. Overall, 83.8 percent who were slated to take the WASL completed all three subject area assessments (reading, writing, and math), but this percentage varied by race/ethnicity. Nearly 90 percent of Asian and White students completed all three assessments compared with about 75 percent of Hispanic and Black students. American Indian students had the lowest completion rate (72 percent).

MEETING STANDARD ON THE WASL BY RACE/ETHNICITY

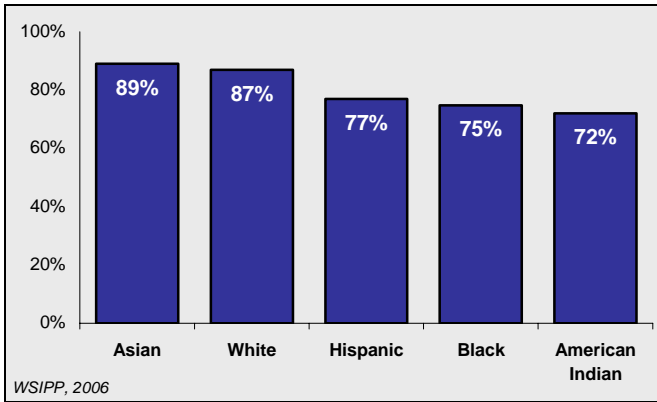
Exhibit 25 portrays overall WASL results for each racial/ethnic category of 10th-grade students in spring 2006. Overall, 53.6 percent of 10th graders who completed the WASL met standard in all three subject areas. Like completion rates, however, the percentage of students who met standard varied considerably by race/ethnicity. Asian and White students had the highest "met standard" rates, with about 60 percent meeting standard in reading, writing and math. Substantially fewer Hispanic, Black, and American Indian students—between 26 and 35 percent—met standard in all three subjects.

SUBJECT-AREA WASL RESULTS BY RACE/ETHNICITY

Exhibit 26 disaggregates student performance on the spring 2006 WASL by subject area and race/ethnicity. Approximately 90 percent of Asian and White students met standard in reading and writing compared with about three-quarters of Black and American Indian students. Hispanic students had the lowest met standard rates in reading and writing.

For each racial/ethnic group, the percentage of students who met standard on the WASL was driven mostly by performance in math. The proportion of students who met standard in math ranges from 27 percent for Black students to 63 percent for Asian students. On average, White students performed near the top of this range while American Indians and Hispanics performed near the bottom.

Exhibit 24
Percentage of Students Who Completed the 10th-Grade WASL by Race/Ethnicity in Spring 2006



SUMMARY OF FINDINGS

The percentage of 10th graders who met standard in all three subject areas of the WASL—reading, writing, and math—is as follows:

- 60.7 percent of Asian students,
- 58.4 percent of White students,
- 34.8 percent of American Indian students,
- 27.7 percent of Hispanic students, and
- 26.1 percent of Black students.

Performance on the WASL overall is driven largely by the percentage of students who met standard in math, which ranges from 27 percent of Black students to 63 percent of Asian students.

Exhibit 25
Percentage of Students Who Met Standard on the 10th-Grade WASL by Race/Ethnicity in Spring 2006

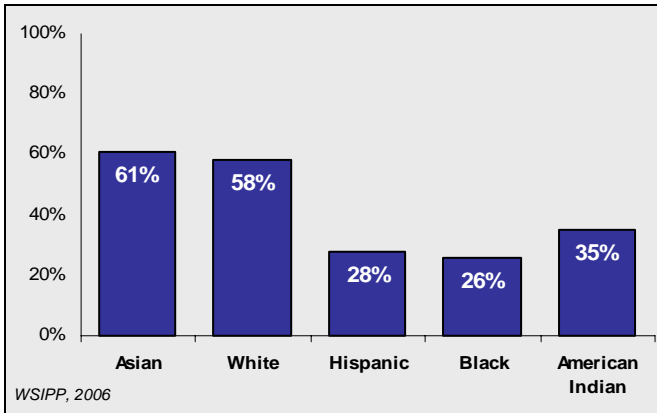
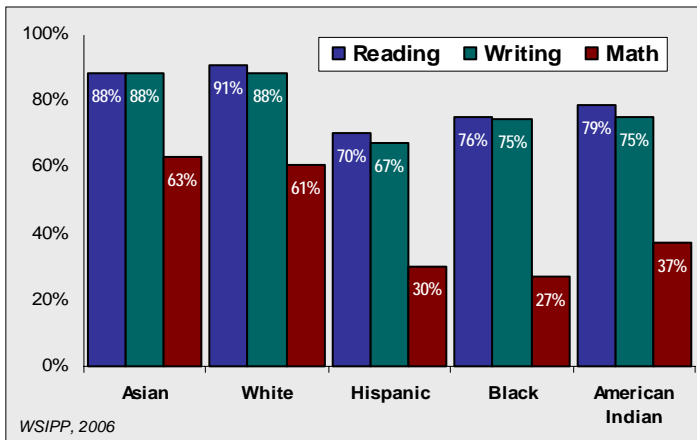


Exhibit 26
Percentage of Students Who Met Standard in Reading, Writing, and Math by Race/Ethnicity in Spring 2006



VII. VARIABILITY IN STUDENT PERFORMANCE ON WASL STRANDS OVER TIME

We now examine longitudinal variability in student performance on math, reading, and writing strands for the 10th-grade WASL.

Strands are subsets of test questions that correspond to different Essential Academic Learning Requirements (EALRs). To illustrate, **Exhibit 27** displays math strands and their corresponding EALRs.²⁸

Exhibit 27
Math Strands and Corresponding EALRs

Strand	Corresponding EALR(s)
Number Sense	1.1
Measurement	1.2
Geometric Sense	1.3
Probability and Statistics	1.4
Algebraic Sense	1.5
Solve Problems/Reason Logically	2.1, 2.2, 3.1, 3.2, 3.3
Communicate Understanding	4.1, 4.2
Make Connections	5.1, 5.2, 5.3

Initially, we sought to determine whether poor performance in one or more strands may have prevented students from meeting WASL standards. We conclude, however, that strand results are inappropriate for diagnosing areas in need of improvement.

Each year, a new version of the WASL is created by sampling from a large pool of questions. The Office of Superintendent of Public Instruction uses “[s]tatistical ‘equating’ procedures...to maintain the same performance standard from year to year and to provide longitudinal comparisons across years even though different questions are used.”²⁹

Thus, yearly variation in the questions on the WASL does not necessarily diminish the *overall* reliability of the reading and math assessments.

However, because *strand-level* performance is based on a relatively small subset of test items, results are less reliable and longitudinal comparisons become more tenuous.

Because strand results are less reliable than overall subject-area assessment results, the percentage of students achieving proficiency in math, reading, and writing strands varies considerably over time.³⁰ As this analysis demonstrates, extreme variation in strand results makes it difficult to compare performance in multiple strands or to draw conclusions about performance trends for a single strand over time.

MATH STRAND RESULTS

Exhibit 28 demonstrates that the percentage of students who achieved proficiency in eight math strands on the 10th-grade WASL varied considerably between 1999 and 2006.

Strand proficiency rates fluctuate by as much as 21.5 percent from one year to the next, which raises concerns about the reliability of strand results over time.

In addition, math strands with the best and worst proficiency rates change from year to year. For example:

- In 1999, Content 3 (geometric sense) had the lowest percentage of students who achieved proficiency and Process 3 (making connections) the highest.
- In 2006, performance was lowest for Content 1 (number sense) and highest for Content 2 (measurement).
- Student performance in Content 4 (probability and statistics) exemplifies the inconsistency of math strand results over time. Content 4 had the lowest proficiency rate in 2001 and 2004 but the highest proficiency rate in 2002 and 2005.

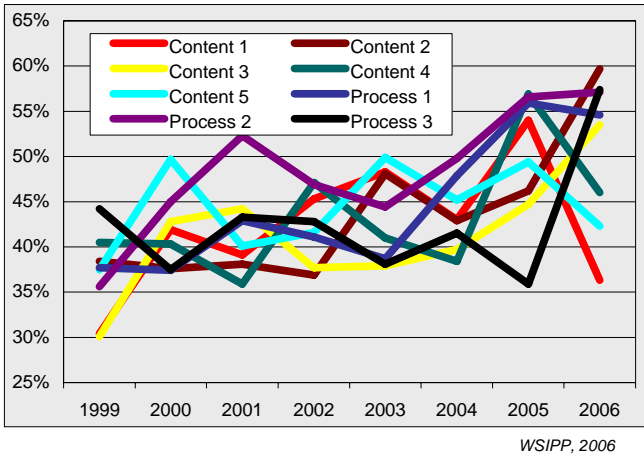
²⁸ <http://www.k12.wa.us/assessment/wasl/MathPracticeTests/AppendixB-HSmath.pdf>.

²⁹ <http://www.k12.wa.us/assessment/WASL/overview.aspx>.

³⁰ Students are proficient in a strand when their scores are equal to or higher than the estimated strand score for students who met standard in the subject-area assessment. Catherine S. Taylor. (2002). *Washington Assessment of Student Learning, Grade 10, 2002, Technical Report*. Olympia, WA: Office of Superintendent of Public Instruction.

Exhibit 28

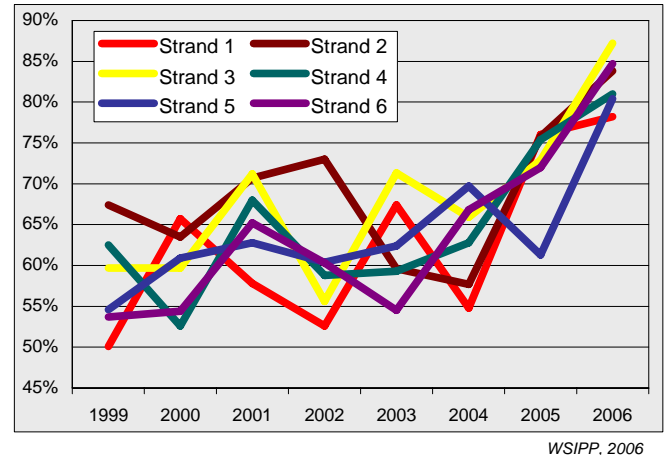
Variation in the Percentage of Students Achieving Proficiency in *Math* Strands on 10th-Grade WASL



- Content 1 Number Sense
- Content 2 Measurement
- Content 3 Geometric Sense
- Content 4 Probability and Statistics
- Content 5 Algebraic Sense
- Process 1 Solve Problems/Reason Logically
- Process 2 Communicate Understanding
- Process 3 Making Connections

Exhibit 29

Variation in the Percentage of Students Achieving Proficiency in *Reading* Strands on 10th-Grade WASL



- Strand 1 Literary Comprehension
- Strand 2 Literary Analysis
- Strand 3 Literary Critical Thinking
- Strand 4 Informational Comprehension
- Strand 5 Informational Analysis
- Strand 6 Informational Critical Thinking

READING STRAND RESULTS

As with math strands, student performance in reading strands exhibits a substantial degree of variation over time. **Exhibit 29** plots the percentage of students who were proficient in six reading strands on the 10th-grade WASL between 1999 and 2006.

The percentage of students who were proficient in each reading strand varies by as much as 21.2 percent from year to year. Reading strands with the highest and lowest proficiency rates also vary over time.

- In 1999, Strand 1 (literary comprehension) had the lowest percentage of students who were proficient and Strand 2 (literary analysis) the highest.
- In 2006, performance was lowest for Strand 1 (literary comprehension) and highest for Strand 3 (literary critical thinking).
- Student performance in one reading strand, Strand 1 (literary comprehension), epitomizes the irregularity of strand results over time. Strand 1 had the lowest proficiency rate in 1999, 2001, 2002, 2004, and 2006 but the highest rate in 2000 and 2005.

Because the trends illustrated in Exhibits 29 and 30 are not readily discernable, Appendix C reports the percentage of students who achieved proficiency in math and reading strands on the 10th-grade WASL between 1999 and 2006 as well as annual changes in the proficiency rate for each strand.

WRITING STRAND RESULTS

Exhibit 30 displays the percentage of students who achieved proficiency in the writing strands:

- Strand 1 Content, Organization, and Style
- Strand 2 Writing Mechanics

With writing, unlike the reading and math results, longitudinal trends are clearly apparent. In 2000, approximately 30 percent of students were proficient in Strand 1; by 2006, performance in this strand climbed to nearly 80 percent of students achieving proficiency. Performance trends in Strand 2 were less dramatic but nevertheless showed improvement: in 2000, 60 percent of students were proficient, compared with slightly more than 80 percent six years later.

CONCLUSIONS

The percentage of students who achieve proficiency in reading and math strands varies considerably over time. *Strand-level* performance from year to year, which is based on a relatively small subset of test items, is less reliable than yearly performance on the reading and math assessments *overall*.

Variability in strand performance means that schools cannot use these results to diagnose specific content areas in need of improvement, but it does not diminish the overall reliability of the reading and math assessments.

Strand results in writing are not characterized by the same degree of variation. Writing strands may be less affected by yearly variation in questions because the writing assessment consists of two writing "prompts" or tasks, which are scored differently than multiple-choice or short-answer questions.³¹

In the next section, we explore the distinction between open-ended responses and multiple-choice questions in greater detail.

SUMMARY OF FINDINGS

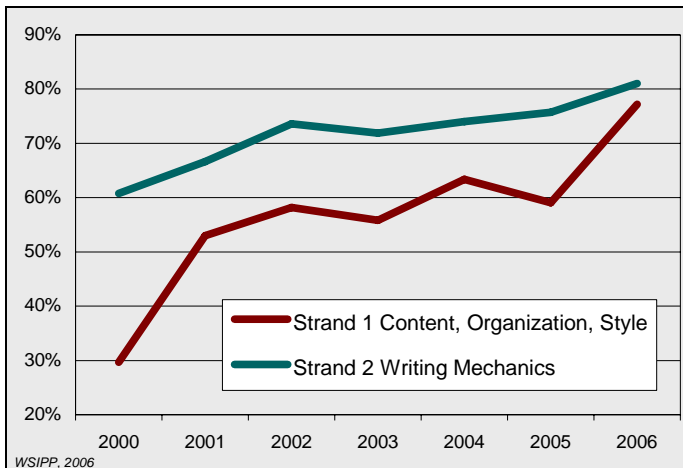
The percentage of students who are proficient in reading and math strands of the 10th-grade WASL varies considerably over time.

Strand-level performance from year to year, which is based on a relatively small subset of test items, is less reliable than performance on the reading and math assessments *overall*.

Variability in strand results does not diminish the overall reliability of the reading and math assessments.

Strand results in writing are not characterized by the same degree of variation as reading and math.

Exhibit 30
Percentage of Students Who Achieved Proficiency in Writing Strands on the 10th-Grade WASL



Reading and mathematics assessments, on the other hand, include a combination of multiple-choice, short-answer, and extended-response questions. Questions are sampled so that "a particular question format...is not always associated with the same EALRs" and, hence, with the same strands.³² If the format of questions associated with a particular strand changes from year to year, and if students perform better in one format than in others, then strand results will also vary.

³¹ <http://www.k12.wa.us/CurriculumInstruct/writing/Annotations/2006/Grade10/Grade10AnnotationsIntro.pdf>.

³² *Ibid.*

VIII. OPEN-ENDED AND MULTIPLE-CHOICE QUESTIONS

This section examines the relationship between student performance on multiple-choice and open-ended items on the 10th-grade WASL in spring 2006.

To this end, we analyze summative scores for multiple-choice and open-ended questions on the math and reading assessments of the WASL:

- Multiple-choice questions require students to select one answer from a set of possible answers; these answers are machine scored.
- Open-ended questions require students to provide their own short-answer or extended responses by summarizing, describing, or evaluating information; explaining and providing support for answers; and making inferences based on text or patterns. Open-ended responses are assessed by teams of scorers and may be awarded partial credit: short answer questions are worth 2 points and extended-response questions are worth 4 points.³³

On average, student performance on different WASL question formats is strongly correlated—that is, students who do well in one format typically do well in the other. Correlations measure the degree of linear association between scores. The statistic ranges between -1.0 and +1.0, where 0.0 represents no association and ± 1.0 indicates a perfect linear association.

For reading, the correlation between summative scores on multiple-choice and open-ended questions is 0.65; for math, the correlation is 0.83. By convention, correlations above 0.50 are considered to be strong.³⁴

The following analyses examine performance on multiple-choice and open-ended questions in greater detail.

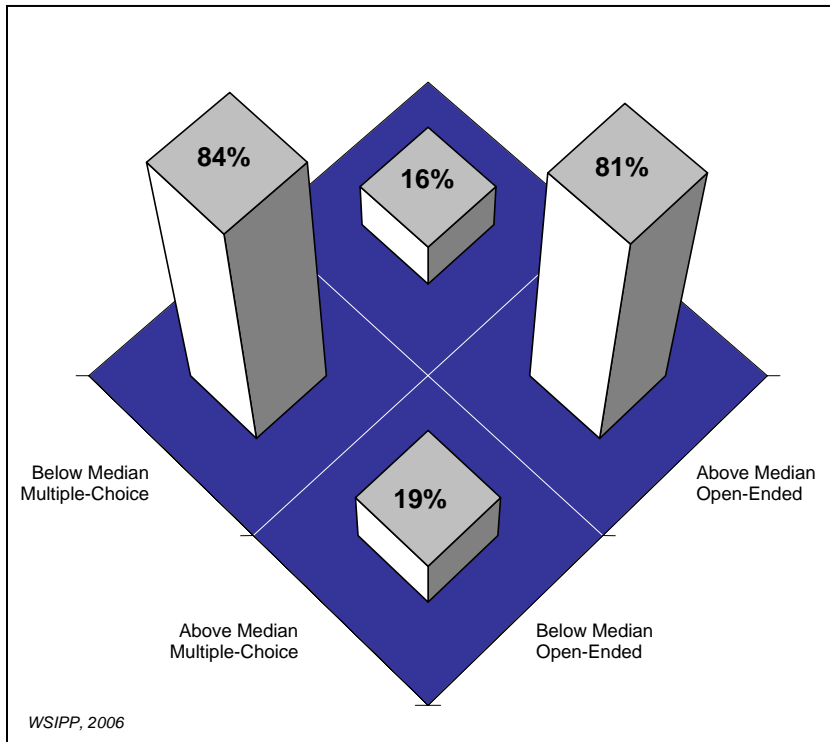
³³ http://www.k12.wa.us/Assessment/pubdocs/Scoring%20the%20WASL_FAQ%20100406.pdf

³⁴ Jacob Cohen. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Hillsdale, NJ: Lawrence Erlbaum.

Exhibit 31

MATH

Students Who Perform Well on Open-Ended Questions Also Do Well on Multiple-Choice Questions



MATH RESULTS

Exhibits 31 and 32 demonstrate that, on average, students who perform well on multiple-choice questions in math also perform well on open-ended questions, and vice versa.

Exhibit 31 displays students' performance on open-ended math questions given their performance on multiple-choice questions. The chart compares students *above and below the median*—students who scored in the top and bottom 50 percent of the distribution for each question format in math. For example:

- 84 percent of students who scored below the median on multiple-choice math questions also scored below the median on open-ended questions.
- Conversely, 81 percent of students who scored above the median on multiple-choice math questions also scored above the median on open-ended questions.
- Comparatively few students performed above the median in one question format but not the other.

Exhibit 32

MATH

Students Who Perform Well on Multiple-Choice Questions Also Do Well on Open-Ended Questions

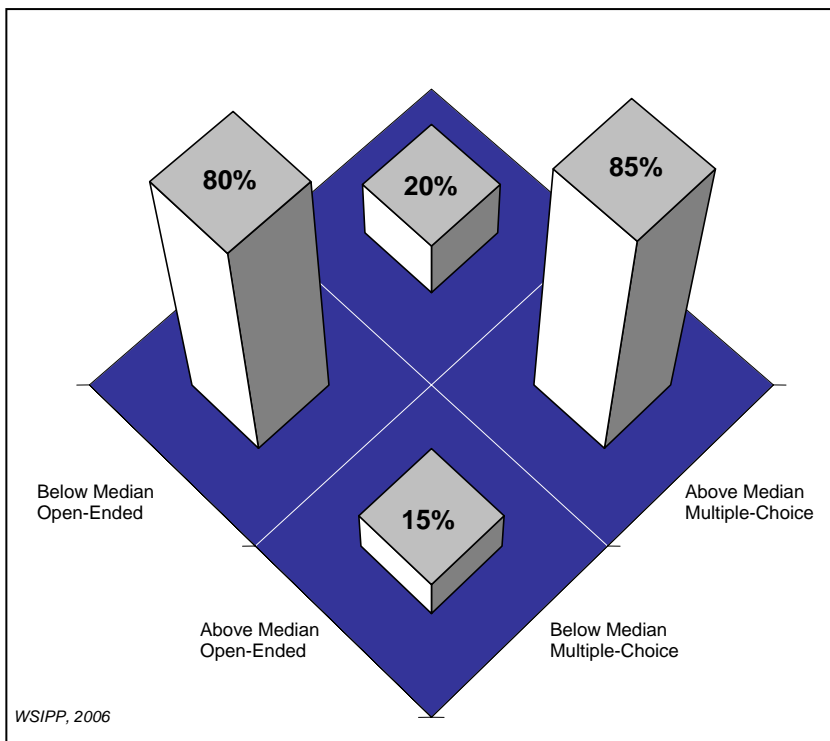
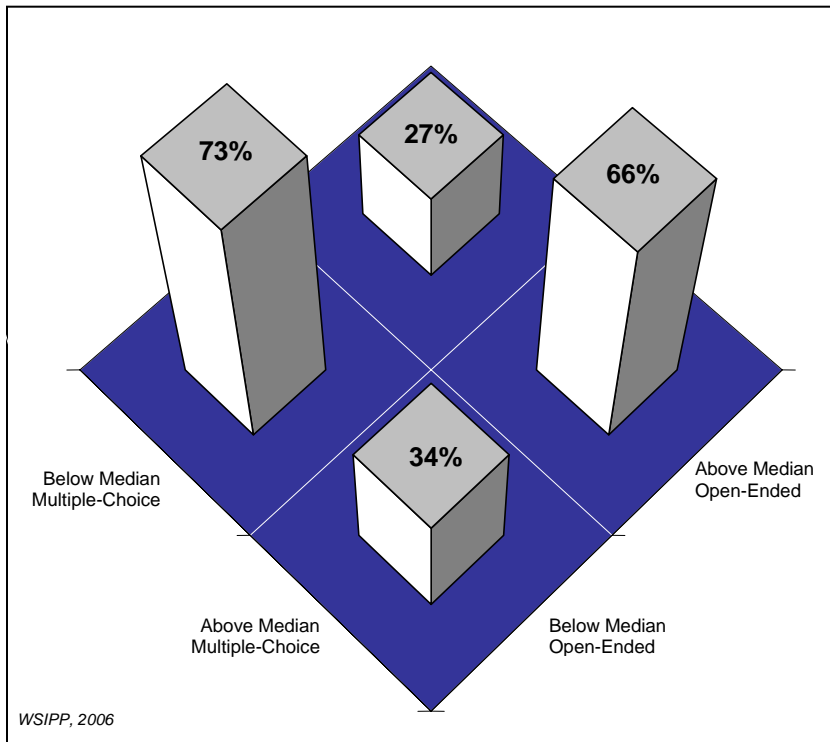


Exhibit 32 presents similar data from a different perspective: it displays students' performance on multiple-choice math questions given their performance on open-ended questions. The trends are similar:

- Most students who scored above the median in one question format also scored above the median in the other.
- Likewise, few students receive above-median scores in one question format but not the other.

**Exhibit 33
READING**

**Students Who Perform Well on Open-Ended Questions
Also Do Well on Multiple-Choice Questions**



READING RESULTS

Exhibits 33 and 34 replicate the analysis of item-format results for reading. Students who perform well on one question format in reading also perform well on the other, although the relationship is not as strong for reading as for math.

Exhibit 33 portrays student performance on open-ended reading questions given performance on multiple-choice questions.

- 73 percent of students with below-median scores on multiple-choice reading questions also had below-median scores on open-ended questions.
- Conversely, 66 percent of students with above-median scores on multiple-choice reading questions also had above-median scores on open-ended questions.
- 34 percent of students who scored above the median on multiple-choice questions received below-median scores on open-ended questions.

**Exhibit 34
READING**

**Students Who Perform Well on Multiple-Choice Questions
Also Do Well on Open-Ended Questions**

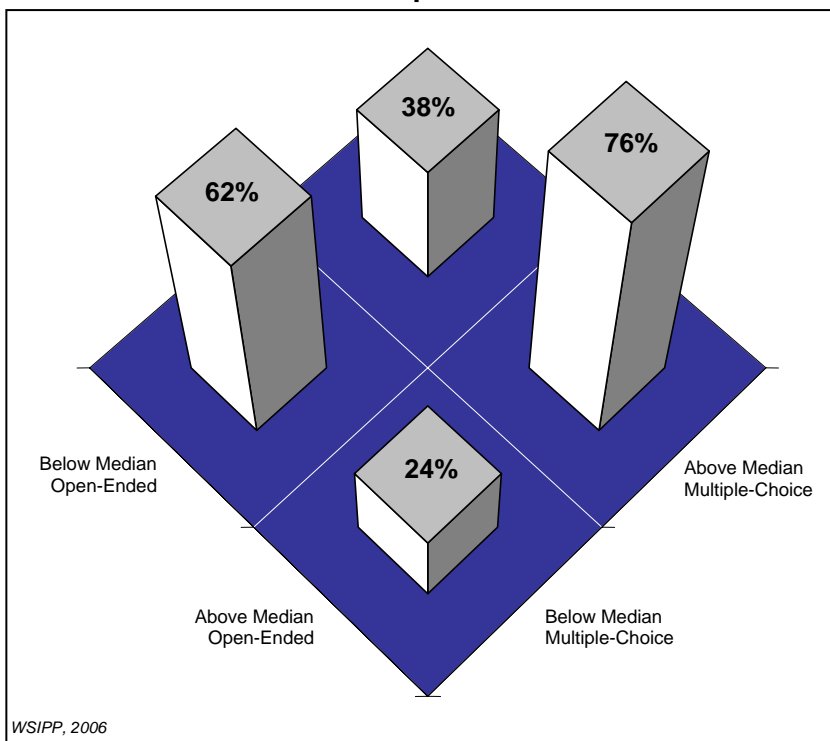


Exhibit 34 illustrates student performance on multiple-choice reading questions given performance on open-ended questions.

- Again, the majority of students who scored above the median in one question format for reading also scored above the median in the other.
- 24 percent of students who scored above the median in open-ended reading questions received below-median scores on multiple-choice questions.
- 38 percent of students with open-ended scores below the median in reading had multiple-choice scores above the median.

RELATIONSHIP BETWEEN OPEN-ENDED RESULTS AND PERFORMANCE IN WRITING

Open-ended questions require students to *write* a response; as such, one might expect to find an association between achievement on open-ended questions and performance on the writing assessment of the WASL.

Exhibit 35 depicts the percentage of students with above-median scores on open-ended reading questions who met and did not meet standard on the writing assessment. Thirteen percent of students who did not meet standard in writing scored above the median on open-ended reading questions compared with 57 percent of students who met the writing standard.

Exhibit 36 shows that the relationship between writing and open-ended math responses is nearly identical to that for open-ended reading responses. As with reading, 13 percent of students who did not meet standard in writing scored above the median on open-ended math questions compared with 58 percent of students who met the writing standard.

In sum, 87 percent of students (100% minus 13%) who did not meet standard in writing also scored below the median on open-ended reading and math questions.

Conversely, nearly 60 percent of students who met standard in writing received above-median scores on open-ended questions. This means that approximately 40 percent of students who met standard in writing nevertheless scored below the median on open-ended questions.

This suggests that proficiency in writing is a necessary but not sufficient condition for achieving above-median scores on open-ended questions.

Exhibit 35
Performance on Open-Ended Questions in Reading by Performance in Writing

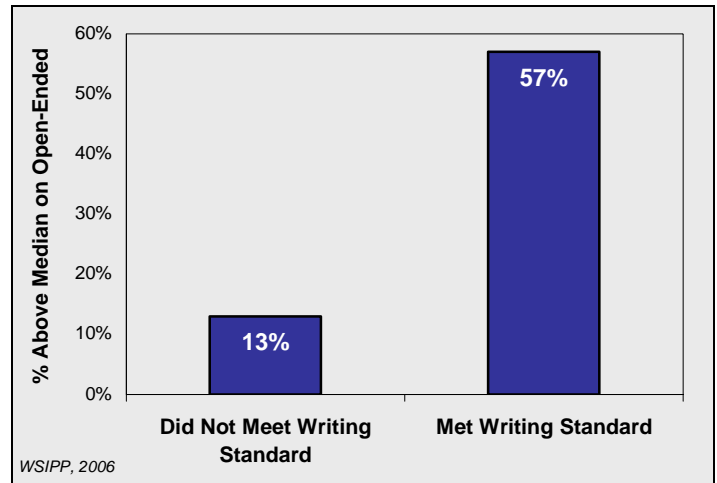
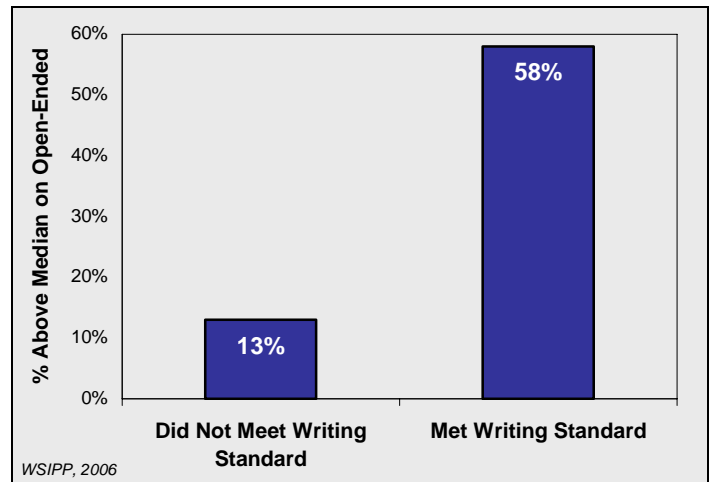


Exhibit 36
Performance on Open-Ended Questions in Math by Performance in Writing



SUMMARY OF FINDINGS

Open-ended and multiple-choice scores on the 10th-grade WASL in spring 2006 are strongly correlated, especially for math.

Students who do well on multiple-choice questions almost always do well on open-ended questions. Similarly, students who do well on open-ended questions also do well on multiple-choice questions.

These associations are stronger for math than for reading, which suggests that multiple-choice and open-ended questions assess similar kinds of skills in math, but less so for reading.

Achievement on open-ended questions and performance on the writing assessment of the WASL are also associated:

- Most students who did not meet standard in writing scored below the median on open-ended reading and math questions.
- A substantial percentage of students who met standard in writing scored above the median on open-ended reading and math questions.

Proficiency in writing appears to be a necessary but not sufficient condition for achieving above-median scores on open-ended questions.

Appendix A: Alternate Assessment Completion

Exhibit A1
**Participation in the 10th-Grade
 Alternate Assessments, Spring 2006**

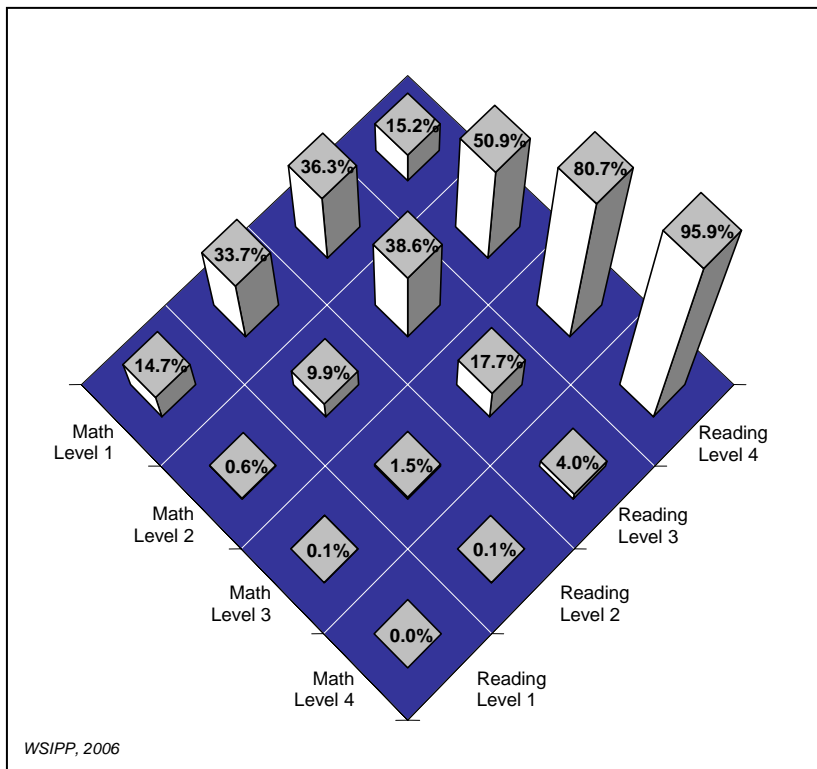
Subject	Number Scheduled	Number Completed	Percent Completed
WASL-Modified			
Reading	664	593	89.3%
Writing	730	647	88.6%
Math	656	582	88.7%
All three	401	314	78.3%
WAAS-Portfolio			
Reading	467	443	94.9%
Writing	485	454	94.2%
Math	465	441	94.8%
All three	455	429	94.3%
WAAS-DAW			
Reading	1,697	1,564	92.2%
Writing	1,756	1,603	91.3%
Math	1,894	1,781	94.0%
All three	1,248	1,125	90.1%

Exhibit A2
**Reasons for Incomplete
 Alternate Assessments, Spring 2006**

WASL-Modified			
Reason Not Completed	Reading (n=71)	Writing (n=83)	Math (n=74)
Absent excused	40.8%	41.0%	32.4%
Absent unexcused not tested	26.8%	10.8%	35.1%
Incomplete not tested	19.7%	31.3%	21.6%
Partially enrolled	7.0%	10.8%	8.1%
Refused not tested	5.6%	3.6%	2.7%
No booklet not tested	—	2.4%	—
WAAS-Portfolio			
Reason Not Completed	Reading (n=24)	Writing (n=28)	Math (n=24)
Refused not tested	100.0%	100.0%	100.0%
WAAS-DAW			
Reason Not Completed	Reading (n=133)	Writing (n=153)	Math (n=113)
Incomplete not tested	33.8%	39.2%	38.9%
Absent excused	31.6%	33.3%	31.9%
Absent unexcused not tested	11.3%	9.2%	16.8%
Refused not tested	15.8%	9.2%	4.4%
Partially enrolled	6.8%	9.2%	8.0%
Medical exemption	0.8%	—	—

Appendix B: Subject Area Relationships by Level of Performance

Exhibit B1
Level of Achievement in Reading Given
Performance in Math on the Spring 2006 WASL



This appendix provides a more nuanced picture of the relationship between different subject areas of the WASL by disaggregating student performance into the following levels:

- Level 1 (Below Basic)
- Level 2 (Basic)
- Level 3 (Proficient)
- Level 4 (Advanced)

Students meet standard on the WASL when they receive Level 3 or Level 4 scores.

For example, Exhibit B1 displays the percentage of students who earned Level 1, 2, 3, or 4 scores in reading given their performance in math.

Among students who received a Level 1 score in math, performance in reading was as follows:

- 14.7 percent received Level 1 scores,
- 33.7 percent received Level 2 scores,
- 36.3 percent received Level 3 scores, and
- 15.2 percent received Level 4 scores.

Conversely, students who received Level 4 scores in math performed in reading as follows:

- 95.9 percent received Level 4 scores,
- 4.0 percent received Level 3 scores,
- 0.1 percent received Level 2 scores, and
- No one received Level 1 scores.

Thus, students who performed well in math also performed well in reading. However, students who performed poorly in math did not necessarily perform below standard in reading.

Exhibit B2
Level of Achievement in Math Given
Performance in Reading on the Spring 2006 WASL

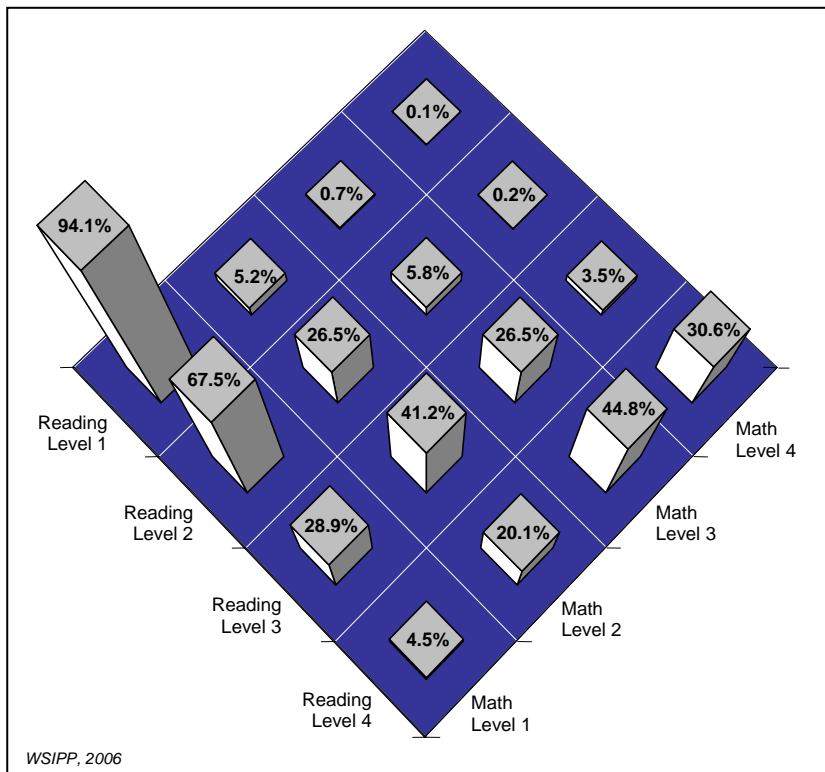
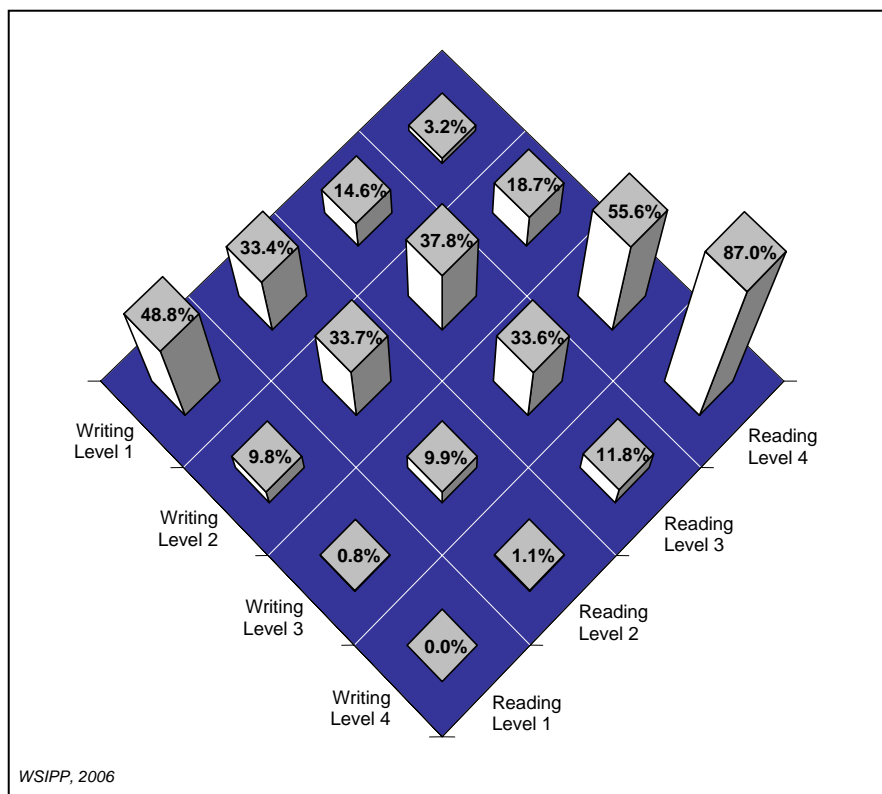


Exhibit B3
Level of Achievement in Reading Given
Performance in Writing on the Spring 2006 WASL



Exhibits B3 and B4 illustrate the relationship between reading and writing.

For instance, Exhibit B3 displays the percentage of students who earned Level 1, 2, 3, or 4 scores in reading given their performance in writing.

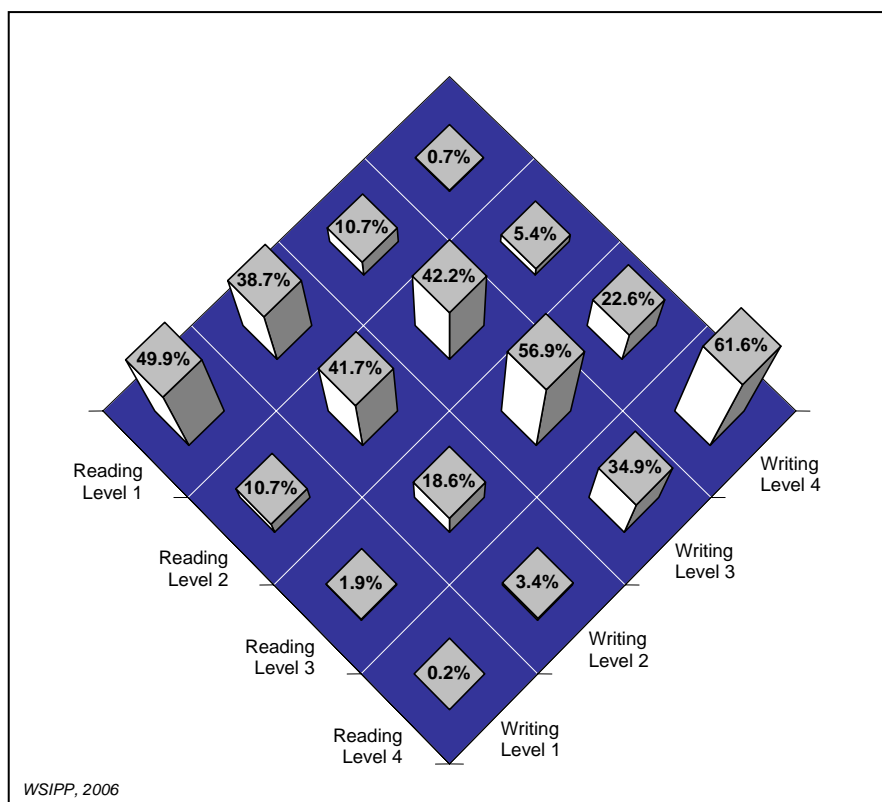
Among students who received a Level 1 score in writing, performance in reading was as follows:

- 48.8 percent received Level 1 scores,
- 33.4 percent received Level 2 scores,
- 14.6 percent received Level 3 scores, and
- 3.2 percent received Level 4 scores.

Conversely, students who received Level 4 scores in writing performed in reading as follows:

- 87.0 percent received Level 4 scores,
- 11.8 percent received Level 3 scores,
- 1.1 percent received Level 2 scores, and
- No one received Level 1 scores.

Exhibit B4
Level of Achievement in Writing Given
Performance in Reading on the Spring 2006 WASL



Students who performed well in reading also performed well in writing; similarly, students who performed well in writing also performed well in reading.

However, students with below-standard in reading did not necessarily perform below standard in writing, nor did students below-standard scores in writing necessarily perform below standard in reading.

Appendix C: Student Performance on Strands

Exhibit C1
**STUDENT PERFORMANCE ON MATH STRANDS
 FOR THE 10TH-GRADE WASL**

Strand	Percentage Achieving Proficiency in Math Strands							
	1999	2000	2001	2002	2003	2004	2005	2006
Content 1	30.4	41.9	39.1	45.3	48.3	43.0	54.0	36.3
Content 2	38.4	37.6	38.1	36.9	48.1	42.9	46.2	59.7
Content 3	30.1	42.8	44.2	37.7	37.9	39.7	44.7	53.5
Content 4	40.5	40.3	35.9	47.1	41.0	38.4	56.9	46.0
Content 5	37.5	49.7	40.1	41.6	49.9	45.2	49.4	42.3
Process 1	37.7	37.4	42.9	41.1	38.7	47.9	55.9	54.6
Process 2	35.6	45.0	52.3	46.9	44.4	49.8	56.6	57.1
Process 3	44.2	37.5	43.3	42.8	38.1	41.5	35.9	57.4

Strand	Annual Changes in Math Strand Proficiency Rates						
	2000	2001	2002	2003	2004	2005	2006
Content 1	11.5	-2.8	6.2	3.0	-5.3	11.0	-17.7
Content 2	-0.8	0.5	-1.2	11.2	-5.2	3.3	13.5
Content 3	12.7	1.4	-6.5	0.2	1.8	5.0	8.8
Content 4	-0.2	-4.4	11.2	-6.1	-2.6	18.5	-10.9
Content 5	12.2	-9.6	1.5	8.3	-4.7	4.2	-7.1
Process 1	-0.3	5.5	-1.8	-2.4	9.2	8.0	-1.3
Process 2	9.4	7.3	-5.4	-2.5	5.4	6.8	0.5
Process 3	-6.7	5.8	-0.5	-4.7	3.4	-5.6	21.5

Exhibit C2
**STUDENT PERFORMANCE ON READING STRANDS
 FOR THE 10TH-GRADE WASL**

Strand	Percentage Achieving Proficiency in Reading Strands							
	1999	2000	2001	2002	2003	2004	2005	2006
Strand 1	50.1	65.7	57.8	52.6	67.4	54.8	76.0	78.2
Strand 2	67.4	63.5	70.7	73.0	59.6	57.7	75.8	83.8
Strand 3	59.7	59.7	71.2	55.6	71.3	65.9	72.9	87.2
Strand 4	62.5	52.6	68.0	58.8	59.3	62.8	75.4	81.0
Strand 5	54.6	60.9	62.8	60.4	62.4	69.7	61.3	80.4
Strand 6	53.7	54.4	65.2	60.3	54.5	66.8	72.0	84.7

Strand	Annual Changes in Reading Strand Proficiency Rates						
	2000	2001	2002	2003	2004	2005	2006
Strand 1	15.6	-7.9	-5.2	14.8	-12.6	21.2	2.2
Strand 2	-3.9	7.2	2.3	-13.4	-1.9	18.1	8.0
Strand 3	0.0	11.5	-15.6	15.7	-5.4	7.0	14.3
Strand 4	-9.9	15.4	-9.2	0.5	3.5	12.6	5.6
Strand 5	6.3	1.9	-2.4	2.0	7.3	-8.4	19.1
Strand 6	0.7	10.8	-4.9	-5.8	12.3	5.2	12.7