Washington State Institute for Public Policy

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TENTH-GRADE WASL STRANDS: STUDENT PERFORMANCE VARIES CONSIDERABLY OVER TIME

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 data."[1]

This report examines longitudinal variability in student performance on math, reading, and writing strands for the 10th-grade Washington Assessment of Student Learning (WASL).

Strands are subsets of test questions that correspond to different Essential Academic Learning Requirements (EALRs). To illustrate, **Exhibit 1** displays math strands and their corresponding EALRs.[2]

Exhibit 1
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, this report 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."[3]

SUMMARY

This report examines longitudinal variability in student performance on reading, writing, and math strands for the 10th-grade Washington Assessment of Student Learning (WASL).

The percentage of students who are proficient 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 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.

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.[4] As this report 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.

[1] SSB 6618, Chapter 352, Laws of 2006.

[2] http://www.k12.wa.us/assessment/wasl/MathPracticeTests/AppendixB-HSmath.pdf.

[3] http://www.k12.wa.us/assessment/WASL/overview.aspx.

[4] 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.

MATH STRAND RESULTS

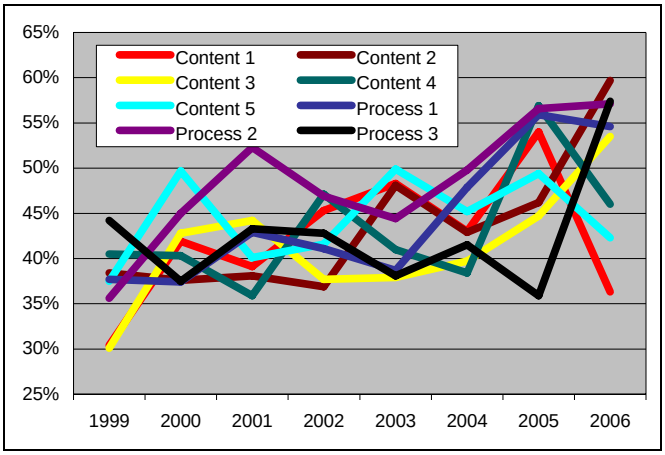
Exhibit 2 demonstrates that the percentage of students who achieved proficiency in eight math strands on the 10th-grade WASL varied considerably between 1999 and 2006.

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.

Exhibit 2
Variation in the Percentage of Students Achieving Proficiency in *Math* Strands on the 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

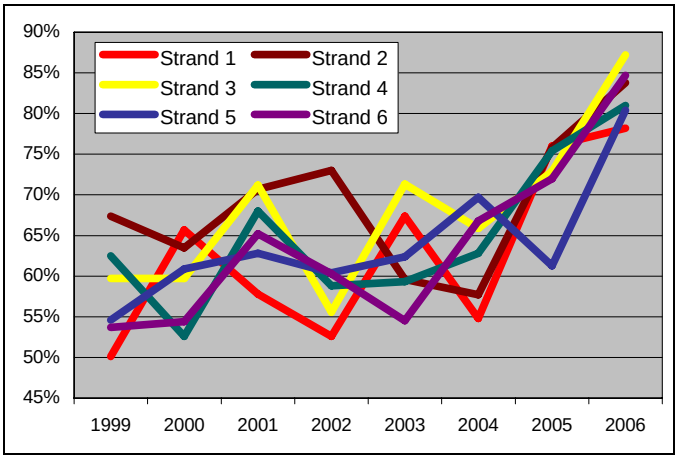
READING STRAND RESULTS

As with math strands, student performance in reading strands exhibits a substantial degree of variation over time. **Exhibit 3** 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.

Exhibit 3
Variation in the Percentage of Students Achieving Proficiency in *Reading* Strands on the 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

Because the trends illustrated in Exhibits 2 and 3 are not readily discernable, Appendices A and B report 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 4 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.

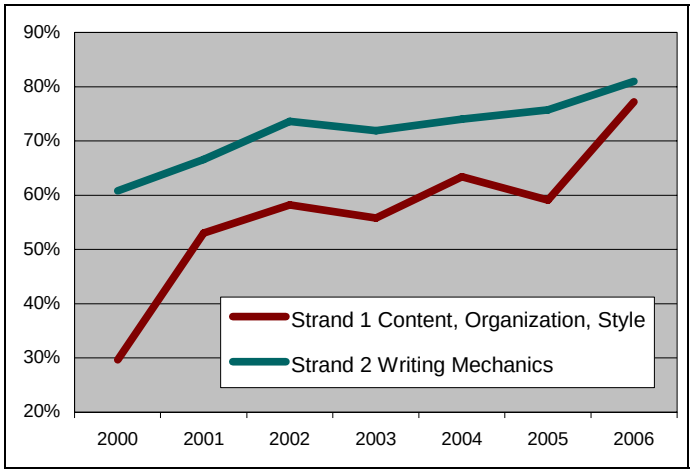
CONCLUSIONS

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.[5]

Exhibit 4
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.[6] 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.

In a companion report, the Institute explores the distinction between open-ended responses and multiple-choice questions in greater detail.

[5] http://www.k12.wa.us/CurriculumInstruct/writing/Annotations/2006/Grade10/Grade10AnnotationsIntro.pdf.

[6] Ibid.

APPENDIX A
STUDENT PERFORMANCE ON MATH STRANDS FOR THE 10TH-GRADE WASL

	Percentage Achieving Proficiency in Math Strands							
Strand	**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

	Annual Changes in Math Strand Proficiency Rates						
Strand	**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

APPENDIX B
STUDENT PERFORMANCE ON READING STRANDS FOR THE 10TH-GRADE WASL

	Percentage Achieving Proficiency in Reading Strands							
Strand	**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

	Annual Changes in Reading Strand Proficiency Rates						
Strand	**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

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Washington State Institute for Public Policy

The Washington State Legislature created the Washington State Institute for Public Policy in 1983. A Board of Directors—representing the legislature, the governor, and public universities—governs the Institute and guides the development of all activities. The Institute's mission is to carry out practical research, at legislative direction, on issues of importance to Washington State.