

APPENDIX M

TEST CURRICULUM ALIGNMENT STUDIES

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Curriculum-Test Alignment Study for New MCAS Tests in 2006: Grade 3 Reading, Grades 5, 6, and 8 English Language Arts, and Grades 3, 5, and 7 Mathematics

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Executive Summary

According to the **Standards for Educational and Psychological Testing** (AERA, APA, & NCME, 1999), three requirements about test content apply to programs such as the MCAS: (1) the content of the tests must be consistent or in alignment with the content specifications for the tests, (2) the tests must show content diversity over time, if the tests from a given year don't cover all of the curricula, and (3) the test items themselves must assess the learning standards to which they are referenced or linked. The first requirement is intended to insure that there are no surprises in the content emphasis of a test each year. The Massachusetts Department of Education has set policy that specifies the number of score points that should be in each content area (called "content strands"), and then the tests are constructed, or should be constructed, so that the number of score points in each content strand remains about the same from year to year and meets the expectations. From our review it is clear that the seven new tests are completely consistent or in alignment with the expectations and meet the content specifications within the 5% tolerance that is permitted by the Massachusetts Department of Education.

The second requirement above recognizes that in any given year it is usually not possible to assess all of the learning standards in the *Massachusetts Curriculum Framework content standards*. Choices of learning standards to be assessed must be made. The requirement, therefore, can be operationalized to mean that over, say, a three-year time period, all or nearly all learning standards in the Massachusetts Curriculum Framework content strands, and that are intended to be included in the large scale test each year (some learning standards are excluded because they are better assessed at the classroom level), will be assessed in at least one of the yearly tests. Since 2006 was the first year of administration, it is not possible to assess the second requirement in this report. Data from several years of testing are needed to assess technical requirement two. This second requirement, if met, would insure, for example, that there would be no advantage for teachers to only teach the learning standards that were assessed on a previous test, since from year to year, the selection of learning standards to be included in a test is made to insure coverage of the curriculum over a several year time-frame. While it is not possible to collect comprehensive data in 2006, our research shows that the percent of learning standards assessed in each of the seven tests in 2006 is very consistent with the results obtained from the more established tests in a single year, and this finding suggests that the Department of Education is well positioned to meet the second requirement within the three year time span.

The third requirement is that evidence is needed to show that the test items and associated scoring rubrics (for the short answer and constructed response items) are measuring the learning standards to which they are referenced or linked. The evidence for requirement three is substantial and provided in the 2006 MCAS Technical Manual produced by the test contractor. The evidence includes (1) the qualifications and training of the item writers, (2) the process the contractor uses to draft, edit, and finalize the test items, (3) the statistical evidence compiled during the piloting phase of item development, and (4) the efforts of the DOE's assessment development committee, external content expert reviewers, DOE staff themselves, and item sensitivity review committees (see the 2001, 2005 and 2006 Massachusetts Technical Manuals for details) to assess the validity of the test items and the related scoring rubrics. That evidence will not be repeated in this report but is readily available to interested individuals in the MCAS Technical Reports that can be found at the DOE website (www.doe.mass.edu).

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In summary, the intent of the contractor and the DOE is to build MCAS tests each year that (1) are consistent or in alignment with the test content specifications, (2) over regular intervals of time, assess all of the learning standards in each curriculum that are intended to be included in the tests, and (3) use test items that are valid indicators of the learning standards to which they are matched. In this study, we reported on our efforts to assess the extent to which the first requirement above, which is one of the technical requirements for “curriculum-test alignment,” is met by the grade 3 Reading, grades 5, 6, and 8 English Language Arts, and grades 3, 5, and 7 Mathematics tests administered in 2006 for the first time. Our research findings are clear: For all seven new tests, the actual distribution of test content was nearly perfectly consistent or in alignment with the test content specifications. This is an excellent result and speaks well of both the contractor and the DOE in their efforts to produce curriculum-test alignment. The University of Massachusetts research team also found that the contractor and the DOE took an excellent first step toward meeting requirement two by assessing relatively large percentages of the learning standards in the first year of testing, and certainly as large as our research team observed in other subject areas and grade levels with a longer history than the seven tests studied in this report. Only one recommendation seems necessary. The DOE and contractor need to continue to monitor that the learning standards intended for classroom assessment, are actually being assessed at the classroom level.

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Curriculum-Test Alignment Study for New MCAS Tests in 2006: Grade 3 Reading, Grades 5, 6, and 8 English Language Arts, and Grades 3, 5, and 7 Mathematics¹

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Purposes

In 2004, 2005, and 2006, the University of Massachusetts Center for Educational Assessment carried out alignment studies between the MCAS grades 4, 7, and 10 English Language Arts (ELA) and grades 4, 6, 8, and 10 Mathematics tests and the test content specifications and the curriculum frameworks (Hambleton & Zhao, 2004, 2005; Hambleton, Zhao, & Smith, 2006). The evidence is strong that the tests are (1) consistent with the test content specifications and (2) comprehensively measure the Massachusetts Curriculum Framework content standards.

In 2006, and to be in compliance with the No Child Left Behind legislation, the Massachusetts Department of Education (DOE) extended the MCAS testing program to include grade 3 Reading, grades 5, 6, and 8 English Language Arts (ELA) and grades 3, 5, and 7 Mathematics. The purposes of this study were similar to the purposes of the earlier studies: (1) investigate the extent to which the MCAS tests are consistent or in alignment with the test content specifications (i.e., the test score point weights assigned to the content strands), and (2) show diversity in test content over several years, so that all learning standards in the ELA and Mathematics curricula that are intended to be included on the large-scale assessments, are actually included. The second purpose was only minimally addressed because the tests were being given for the first time in 2006. We did consider the percentage of learning standards assessed by other more established MCAS tests to see if the first year results from the new tests were comparable.

Methods

Information about the test content specifications is provided in the 2005 and 2006 Technical Manuals found at the Massachusetts Department of Education's website (www.doe.mass.edu). Details on the specific learning standards (LS) included in each test and the number of score points were provided to us by the contractor and the DOE (see MDOE, 2006a, 2006b, 2006c, 2006d, 2006e, 2006f, 2006g, 2006h, 2006i). The DOE does offer specifications too for the balance of item types (multiple-choice, short answer, and constructed response) but that information is not important for curriculum-test alignment requirements one and two. The test item-learning standard matches (based on the procedures and findings reported in the 2001, 2005, and 2006 Technical Manuals) are well-documented and so that aspect of the curriculum-test alignment study will not be repeated here. The evidence includes (1) the qualifications and training of the item writers, (2) the process the contractor uses to draft, edit, and finalize the test items, (3) the statistical evidence compiled during the piloting phase of item development, and (4) the efforts of the DOE's assessment development committee, external content expert reviewers, DOE staff themselves, and item sensitivity review committees (see the 2001, 2005 and 2006 Massachusetts Technical Manuals for details), to assess the validity of the test items and the related scoring rubrics.

For our work in preparing this report we used the 2001, 2005 and 2006 (draft) Massachusetts Technical Manuals (see www.doe.mass.edu); a number of Massachusetts curriculum reports (Massachusetts Department of Education, 2006a, 2006b, 2006c, 2006d, 2006e, 2006f, 2006g, 2006h, and 2006i) and, finally, some earlier Massachusetts Department of Education reports (2000, 2001, 2004a, 2004b).

¹This work was carried out under a contract between the University of Massachusetts Center for Educational Assessment, and Measured Progress and the Massachusetts Department of Education, 2006-2007. *Center for Educational Assessment Research Report No. 613*. Amherst, MA: University of Massachusetts, Center for Educational Assessment.

Results

The findings from our analysis of the seven new tests in 2006 are reported in Tables 1 to 19.

Grade 3 Reading

Table 1 contains the intended score points of the test for the two curriculum strands (called the “test content targets” in this report). Table 6 provides the match between the content on the 2006 test and the target. The largest difference between the target percentage and the actual percentage for any content strand was 3.4%. This discrepancy is within the tolerance that the DOE allows the contractor and is a very reasonable tolerance level in practical test development work.

Table 13 shows that nine of the 11 learning standards were assessed, or 81.8%, on the spring 2006 test. (Learning standards 6 and 9 were not included in the calculations because they are not normally included in the tests. They are normally assessed at the classroom level.) This figure of 81.8% compares favorably with the percent of learning standards assessed on the grade 4 English Language Arts test (the test closest in the curriculum to the grade 3 reading test). These percentages ranged from 75.0% to 100% between 2001 and 2006.

Grades 5, 6, and 8 English Language Arts

Table 2 contains the intended score points of the assessment for the two curriculum standards at grades 5, 6, and 8. Table 7 highlights that the grade 5 test content specifications and the test itself differ by at most 4.3% in any of the content strands and so the test is within the 5% tolerance level allowed the contractor by the DOE. The language strand is underweighted by two score points. Table 8 highlights that the grade 6 test deviates from the target by 2.4%. Again, the language strand is underweighted, this time by about one score point. Table 9 shows that the grade 8 test is completely consistent for each content strand with the target.

Tables 14, 15, and 16 show, for grades 5, 6, and 8, that the percentage of learning standards in each test is 90.1%, 81.8%, and 81.8%, respectively. (Again, learning standards 6 and 9 were excluded from the calculations. They are identified in the tables because they are taught and the testing is normally done at the classroom level.) These percent figures are comparable to the findings at other grade levels (i.e., grades 4, and 7) and so the contractor and the DOE appear to be following a good track for approaching 100% coverage over the next three years. In grade 4 ELA, the percentages across six years (2001 to 2006) varied between 75.0% and 100%; in grade 7 ELA, the percentages across six years varied between 81.3% and 100.0%.

Grades 3, 5, and 7 Mathematics

Tables 3, 4, and 5 contain the desired or target number of score points in the five content strands of the mathematics curricula at grades 3, 5, and 7. The weights are very close to each other, and consistent with the content strand targets at other grade levels (i.e., grades 4, 6, 8, and 10).

Tables 10, 11, and 12 highlight the matches between the percentage of score points in the grades 3, 5, and 7 mathematics tests, respectively, and the targets. For grade 3, the discrepancy never exceeded 5% for any content strand. For number sense and operations, the discrepancy was exactly 5% (35% in the target versus 30% actual). For other content strands the matches were close and less than 5%. For grades 5 and 8, the discrepancy was effectively 0%.

Tables 17, 18, and 19 show, for grades 3, 5, and 7, that the percentage of learning standards in each test is 66.7%, 71.4%, and 80.8%, respectively, and very much in line with the percentages observed at other grade levels (i.e., grades 4, 6, 8, and 10). By comparison, these percentages are a bit lower than the percentages noted in Reading and English Language Arts, but this does not reflect a different test construction policy but rather reflects the increased number of learning standards in the mathematics curriculum at each grade level (25 or more learning standards in mathematics at grades 3, 5, and 7, compared to 11 in Reading and English Language Arts at grades 3, 5, 6, and 8).

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Conclusions

The matches between the content specifications and the actual test content appear to be excellent for the seven new MCAS tests in 2006. The coverage of the learning standards for all of the tests is comparable to the tests in the same subjects at other grades. But ultimately, the goal will be to see if, over administrations, the percentage of learning standards being included in the assessments approaches 100%. The contractor and the DOE appear to have started off well, and now, if Tables 13 to 19 become part of the test development process (or tables like them), the MCAS tests will achieve the first two technical criteria described at the beginning of this report: the allocation of score points in each test is consistent or aligned with the target test content specifications, and the percentage of learning standards assessed at least once over a three year period is close to 100%.

Based on the findings from our study and findings reported in the technical manuals regarding test item-learning standard match, we believe that the evidence for curriculum-test alignment is strong. Next year it will be possible to see to what extent the percentage of learning standards assessed over a three year period has increased. The percentages are already high (ranging from 81.8% to 90.1% in Reading and Language Arts and from 66.7% to 80.8% in Mathematics). Only one recommendation seems necessary. The DOE and contractor need to continue to monitor that the learning standards intended for classroom assessment are actually being assessed at the classroom level.

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Table 1

Approximate Distribution of Grades 3 Reading Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 48) |
|------------------------|-----------------------------------|
| Language | 18% (9 points) |
| Reading and Literature | 82% (39 points) |
| Composition | 0% (0 points) |

See Massachusetts Department of Education (2006h) for the information in the table.

Table 2

Approximate Distribution of Grades 5, 6, and 8 English Language Arts Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 52) |
|------------------------|-----------------------------------|
| Language | 12% (6 points) |
| Reading and Literature | 88% (46 points) |
| Composition | 0% (0 points) |

See Massachusetts Department of Education (2006h) for the information in the table.

Table 3

Approximate Distribution of Grade 3 Mathematics Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 40) |
|---------------------------------|-----------------------------------|
| Data Analysis, Statistics, etc. | 20% (8 points) |
| Geometry | 12.5% (5 points) |
| Measurement | 12.5% (5 points) |
| Number Sense and Operations | 35% (14 points) |
| Patterns, etc. | 20% (8 points) |

See Massachusetts Department of Education (2006i) for the information in the table.

Table 4

Approximate Distribution of Grade 5 Mathematics Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 54) |
|---------------------------------|-----------------------------------|
| Data Analysis, Statistics, etc. | 15% (8 points) |
| Geometry | 13% (7 points) |
| Measurement | 13% (7 points) |
| Number Sense and Operations | 33% (18 points) |
| Patterns, etc. | 26% (14 points) |

See Massachusetts Department of Education (2006i) for the information in the table.

Table 5

Approximate Distribution of Grade 7 Mathematics Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 54) |
|---------------------------------|-----------------------------------|
| Data Analysis, Statistics, etc. | 20% (11 points) |
| Geometry | 13% (7 points) |
| Measurement | 13% (7 points) |
| Number Sense and Operations | 26% (14 points) |
| Patterns, etc. | 28% (15 points) |

See Massachusetts Department of Education (2006i) for the information in the table.

Table 6

Grade 3 Reading Content Strands
(Percent of Total Points/Number of Points)

| Strand Standards | Target % | Actual Distribution |
|----------------------|-------------|---------------------|
| | | 2006 |
| Language 4-6 | 18% | 14.6% 7 |
| Read/Lit. 8-17 | 82% | 85.4% 41 |
| Composition 19-22 | 0% | 0% 0 |
| TOTAL | 100% | 48 |

See Massachusetts Department of Education (2006h) for the information in the table.

Table 7

Grade 5 ELA Content Strands
(Percent of Total Points/Number of Points)

| Strand Standards | Target % | Actual Distribution |
|----------------------|-------------|---------------------|
| | | 2006 |
| Language 4-6 | 12% | 7.7% 4 |
| Read/Lit. 8-17 | 88% | 92.3% 48 |
| Composition 19-22 | 0% | 0% 0 |
| TOTAL | 100% | 52 |

See Massachusetts Department of Education (2006h) for the information in the table.

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Table 8
Grade 6 ELA Content Strands
(Percent of Total Points/Number of Points)

| Strand Standards | Target % | Actual Distribution |
|----------------------|----------|---------------------|
| | | 2006 |
| Language 4-6 | 18% | 14.60% 5 |
| Read/Lit. 8-17 | 82% | 85.40% 47 |
| Composition 19-22 | 0% | 0% 0 |
| TOTAL | 100% | 52 |

See Massachusetts Department of Education (2006h) for the information in the table.

Table 9
Grade 8 ELA Content Strands
(Percent of Total Points/Number of Points)

| Strand Standards | Target % | Actual Distribution |
|----------------------|----------|---------------------|
| | | 2006 |
| Language 4-6 | 12% | 11.5% 6 |
| Read/Lit. 8-17 | 88% | 88.5% 46 |
| Composition 19-22 | 0% | 0% 0 |
| TOTAL | 100% | 52 |

See Massachusetts Department of Education (2006h) for the information in the table.

Table 10

Grade 3 Mathematics Content Strands
(Percent of Total Points/Number of Points)

| Strand | Target % | Actual Distribution |
|---------------------------------|-------------|---------------------|
| | | 2006 |
| Data Analysis, Statistics, etc. | 20% | 20% 8 |
| Geometry | 12.50% | 15% 6 |
| Measurement | 12.50% | 15% 6 |
| Number Sense and Operations | 35% | 30% 12 |
| Patterns, etc. | 20% | 20% 8 |
| TOTAL | 100% | 40 |

See Massachusetts Department of Education (2006i) for the information in the table.

Table 11

Grade 5 Mathematics Content Strands
(Percent of Total Points/Number of Points)

| Strand | Target % | Actual Distribution |
|---------------------------------|-------------|---------------------|
| | | 2006 |
| Data Analysis, Statistics, etc. | 15% | 14.8% 8 |
| Geometry | 13% | 13% 7 |
| Measurement | 13% | 13% 7 |
| Number Sense and Operations | 33% | 33.3% 18 |
| Patterns, etc. | 26% | 25.9% 14 |
| TOTAL | 100% | 54 |

See Massachusetts Department of Education (2006i) for the information in the table.

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Table 12

Grade 7 Mathematics Content Strands
(Percent of Total Points/Number of Points)

| Strand | Target % | Actual Distribution |
|---------------------------------|----------|---------------------|
| | | 2006 |
| Data Analysis, Statistics, etc. | 20% | 20.4% 11 |
| Geometry | 13% | 13% 7 |
| Measurement | 13% | 13% 7 |
| Number Sense and Operations | 26% | 25.9% 14 |
| Patterns, etc. | 28% | 27.8% 15 |
| TOTAL | 100% | 54 |

See Massachusetts Department of Education (2006i) for the information in the table.

Table 13

Grade 3 Reading Learning Standards (13)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year 2006 |
|---------------------------|--------------|
| 4 | 6/6 |
| 5 | 1/1 |
| 6 | X |
| 8 | 13/13 |
| 9 | X |
| 10 | 2/2 |
| 11 | |
| 12 | 9/12 |
| 13 | 4/7 |
| 14 | 2/2 |
| 15 | 1/1 |
| 16 | |
| 17 | 4/4 |
| TOTAL | 42/48 |
| <u>% of LS Assessed</u> | <u>81.8</u> |

See Massachusetts Department of Education (2006h) for the information in the table.

Note: Learning standards 1, 2, 3, 7, 18, and 24 to 27 are not included in the annual MCAS assessments, and instead, they are assessed by teachers at the classroom level.

Learning standards 6 (formal and informal English) and 9 (making connections) are rarely included in the annual MCAS assessments because of their nature, but occasionally they are assessed. They are normally assessed by teachers at the classroom level. These learning standards are not included in the % of LS assessed calculation above.

Learning standards 14, 16, and 17 associated with poetry, myths and traditions, and drama, respectively, are sometimes included in the assessments and other times the genres are used in assessing other learning standards.

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Table 14

Grade 5 English Language Arts Learning Standards (13)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year 2006 |
|---------------------------|--------------|
| 4 | 3/3 |
| 5 | 1/1 |
| 6 | X |
| 8 | 8/11 |
| 9 | X |
| 10 | 2/2 |
| 11 | 1/1 |
| 12 | 6/9 |
| 13 | 9/15 |
| 14 | 3/3 |
| 15 | 5/5 |
| 16 | 2/2 |
| 17 | |
| TOTAL | 40/52 |
| <u>% of LS Assessed</u> | <u>90.1</u> |

See Massachusetts Department of Education (2006h) for the information in the table.

Note: Learning standards 1, 2, 3, 7, 18, and 24 to 27 are not included in the annual MCAS assessments, and instead, they are assessed by teachers at the classroom level.

Learning standards 6 (formal and informal English) and 9 (making connections) are rarely included in the annual MCAS assessments because of their nature, but occasionally they are assessed. They are normally assessed by teachers at the classroom level. These learning standards are not included in the % of LS assessed calculation above.

Learning standards 14, 16, and 17 associated with poetry, myths and traditions, and drama, respectively, are sometimes included in the assessments and other times the genres are used in assessing other learning standards.

Table 15

Grade 6 English Language Arts Learning Standards (13)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year 2006 |
|------------------------|-----------|
| 4 | 4/4 |
| 5 | 1/1 |
| 6 | X |
| 8 | 7/7 |
| 9 | 1/4 |
| 10 | 1/1 |
| 11 | |
| 12 | 5/5 |
| 13 | 12/18 |
| 14 | 2/5 |
| 15 | 4/4 |
| 16 | 3/3 |
| 17 | |
| TOTAL | 40/52 |
| % of LS Assessed | 81.8 |

See Massachusetts Department of Education (2006h) for the information in the table.

Note: Learning standards 1, 2, 3, 7, 18, and 24 to 27 are not included in the annual MCAS assessments, and instead, they are assessed by teachers at the classroom level.

Learning standards 6 (formal and informal English) and 9 (making connections) are rarely included in the annual MCAS assessments because of their nature, but occasionally they are assessed. They are normally assessed by teachers at the classroom level. These learning standards are not included in the % of LS assessed calculation above.

Learning standards 14, 16, and 17 associated with poetry, myths and traditions, and drama, respectively, are sometimes included in the assessments and other times the genres are used in assessing other learning standards.

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Table 16

Grade 8 English Language Arts Learning Standards (13)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year 2006 |
|-------------------------|-------------|
| 4 | 5/5 |
| 5 | 1/1 |
| 6 | X |
| 8 | 5/5 |
| 9 | X |
| 10 | |
| 11 | 1/4 |
| 12 | 6/6 |
| 13 | 11/17 |
| 14 | 3/3 |
| 15 | 2/2 |
| 16 | |
| 17 | 6/9 |
| TOTAL | 40/52 |
| <u>% of LS Assessed</u> | <u>81.8</u> |

See Massachusetts Department of Education (2006h) for the information in the table.

Note: Learning standards 1, 2, 3, 7, 18, and 24 to 27 are not included in the annual MCAS assessments, and instead, they are assessed by teachers at the classroom level.

Learning standards 6 (formal and informal English) and 9 (making connections) are rarely included in the annual MCAS assessments because of their nature, but occasionally they are assessed. They are normally assessed by teachers at the classroom level. These learning standards are not included in the % of LS assessed calculation above.

Learning standards 14, 16, and 17 associated with poetry, myths and traditions, and drama, respectively, are sometimes included in the assessments and other times the genres are used in assessing other learning standards.

Table 17

Grade 3 Mathematics Learning Standards (33)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year 2006 |
|------------------------|-----------|
| 3.D.1 | 1/2 |
| 3.D.2 | 1/1 |
| 3.D.3 | 4/4 |
| 3.D.4 | 1/1 |
| 3.G.1 | |
| 3.G.2 | 2/3 |
| 3.G.3 | |
| 3.G.4 | 1/1 |
| 3.G.5 | 1/1 |
| 3.G.6 | 1/1 |
| 3.G.7 | |
| 3.M.1 | |
| 3.M.2 | 1/1 |
| 3.M.3 | |
| 3.M.4 | 3/4 |
| 3.M.5 | 1/1 |
| 3.N.1 | 2/2 |
| 3.N.2 | 1/1 |
| 3.N.3 | 1/1 |
| 3.N.4 | |
| 3.N.5 | 1/1 |
| 3.N.6 | |
| 3.N.7 | |
| 3.N.8 | 2/2 |
| 3.N.9 | 2/3 |
| 3.N.10 | |
| 3.N.11 | |
| 3.N.12 | 1/1 |
| 3.N.13 | 1/1 |
| 3.P.1 | 3/4 |
| 3.P.2 | |
| 3.P.3 | 2/2 |
| 3.P.4 | 2/2 |
| TOTAL | 35/40 |
| % of LS Assessed | 66.7 |

See Massachusetts Department of Education (2006i) for the information in the table.

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Table 18
Grade 5 Mathematics Learning Standards (35)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year 2006 |
|---------------------------|--------------|
| 5.D.1 | 2/2 |
| 5.D.2 | 2/5 |
| 5.D.3 | 1/1 |
| 5.G.1 | 1/1 |
| 5.G.2 | 1/1 |
| 5.G.3 | |
| 5.G.4 | |
| 5.G.5 | |
| 5.G.6 | 1/4 |
| 5.G.7 | 1/1 |
| 5.M.1 | 3/6 |
| 5.M.2 | 1/1 |
| 5.M.3 | |
| 5.M.4 | |
| 5.M.5 | |
| 5.N.1 | |
| 5.N.2 | 2/2 |
| 5.N.3 | 1/1 |
| 5.N.4 | 3/3 |
| 5.N.5 | 1/1 |
| 5.N.6 | 1/1 |
| 5.N.7 | 2/2 |
| 5.N.8 | 1/1 |
| 5.N.9 | 1/1 |
| 5.N.10 | |
| 5.N.11 | |
| 5.N.12 | 1/1 |
| 5.N.13 | 1/4 |
| 5.N.14 | 1/1 |
| 5.P.1 | 1/1 |
| 5.P.2 | |
| 5.P.3 | 4/4 |
| 5.P.4 | 1/1 |
| 5.P.5 | 4/7 |
| 5.P.6 | 1/1 |
| TOTAL | 39/54 |
| % of LS Assessed | 71.4 |

See Massachusetts Department of Education (2006i) for the information in the table.

Table 19

| Grade 7 Mathematics Learning Standards (28) (Number of Items/ Number of Points Per Assessment Each Year) | |
|---|-----------|
| Learning Standard (LS) | Year 2006 |
| 7.D.1 | 2/5 |
| 7.D.2 | 4/4 |
| 7.D.3 | 2/2 |
| 7.G.1 | 1/1 |
| 7.G.2 | 1/1 |
| 7.G.3 | |
| 7.G.4 | 1/1 |
| 7.G.5 | X |
| 7.G.6 | 1/4 |
| 7.G.7 | |
| 7.M.1 | 1/1 |
| 7.M.2 | |
| 7.M.3 | 3/6 |
| 7.N.1 | 5/5 |
| 7.N.2 | 1/1 |
| 7.N.3 | 1/1 |
| 7.N.4 | 1/1 |
| 7.N.5 | 1/1 |
| 7.N.6 | X |
| 7.N.7 | |
| 7.N.8 | |
| 7.N.9 | 2/5 |
| 7.P.1 | 3/3 |
| 7.P.2 | 3/3 |
| 7.P.3 | 3/6 |
| 7.P.4 | 1/1 |
| 7.P.5 | 1/1 |
| 7.P.6 | 1/1 |
| TOTAL | 39/54 |
| % of LS Assessed | 80.8 |

See Massachusetts Department of Education (2006i) for the information in the table.

Note: Learning standards 7.G.5 and 7.N.6 are part of the grade 7 mathematics curriculum but are assessed at the classroom level. 7.G.5 requires geometric equipment that is not routinely supplied for MCAS assessments, and 7.N.6 is rather subjective in nature. They are included in the list of learning standards above, but they not used in the calculations of the “% of LS Assessed.”

Appendix M

MCAS 2006 Curriculum-Test Alignment Study Update²

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Hambleton and Zhao (2004, 2005) carried out curriculum-test alignment studies for grades 4, 7, and 10 English Language Arts and grades 4, 6, 8, and 10 mathematics for the time period between 2001 and 2004 (and at the grade 10 level, from 1998 to 2004). For the most recent alignment study on the eight new MCAS tests, see Hambleton, Smith, and Zhao (2006).

Two technical criteria were used in the evaluation of the curriculum-test alignments: (1) the degree of match between the content specifications for the tests and the actual percentage of score points included in each content strand, and (2) the percentage of learning standards included in the tests over each three year period since 2001. The conclusion stated in the 2004 and 2005 reports was that when the findings were combined with the evidence about the high level of test item-learning standard matches (evidence available in the annual technical manuals), the seven MCAS tests showed a high level of curriculum-test alignment, with only minor adjustments in the selection of test content being necessary. Minor suggestions for improving curriculum-test alignments were described in the reports themselves.

But curriculum-test alignment for the tests used in 2005 and 2006 must also be reviewed and the level of curriculum-test alignment established. The purpose of this report is to bring the curriculum-test alignment evidence for the seven tests up-to-date by reporting on the findings from 2005 and 2006 in the context of the curriculum-test alignments over the last six years.

The UMass group did make a couple of adjustments in their statistical calculations in this report. In the English Language Arts curricula, learning standards 6 and 9 have been identified as learning standards that should be assessed at the classroom level. But, sometimes they have been included in the annual spring tests. Therefore, we determined each year, from 2001 to 2004, whether these two learning standards were included in the tests and we counted them in the calculation of percent of learning standards assessed. In hindsight, this was probably not the best decision to make since they were intended to be measured primarily at the classroom level. Beginning with this report we have decided to count these learning standards as part of the curriculum at each grade, but not include them in the calculation of the percent of learning standards assessed each year. When occasionally they are included in a test, we still will not include them in the calculation of the percent of learning standards assessed in a test in that year. This seems to be the best way to handle the calculations because then we can apply a consistent rule regarding these two learning standards. In this report, too, we went back and updated the statistics from previous years so that these two learning standards are now being treated in all the analyses in exactly the same way at grades 3, 4, 5, 6, 7, 8, and 10. They will not be included in the calculations of percent of learning standards assessed each year.

A small problem arose too with the learning standards at a grade level in mathematics. Some of these were learning standards coded to a lower grade level. Over time, these learning standards have been included less and less in the grade level tests. The question is, how should they be treated in the calculations of learning standards assessed each year or over a period of three years? If we pulled them from the list of learning standards, problems would arise with the item and score point counts in the earlier years since these off-grade learning standards were occasionally assessed. On the other hand, to include them as not being assessed in more recent years when they were being de-emphasized in the curricula would lead to misleadingly low statistics regarding curriculum-test alignment. To drop them would inflate the more recent summary statistics in relation to earlier years when they were included in the counts but not usually assessed. We decided then to remove most of the non-grade level learning standards from the calculations of learning standards assessed so that changes over time in the percent of learning standards being assessed would not be biased. At the same time, we left these learning standards in the tables so that

² This work was carried out under a contract between the University of Massachusetts Center for Educational Assessment, and Measured Progress and the Massachusetts Department of Education, 2005-2006. **Center for Educational Assessment Research Report No. 612.** Amherst, MA: University of Massachusetts, Center for Educational Assessment.

the counts of number of items and score points would not be inconsistent with the actual tests, and so the information could be considered in addressing the matches between content specifications and the actual distribution of score points in the tests. Finally, we have become aware recently that several additional learning standards have been recommended for inclusion in the classroom assessments of teachers. As a result, we have revised the tables and statistics being reported accordingly. These learning standards are indicated in footnotes to the tables.

Results

Twenty-one tables and 8 figures summarizing the findings from our 2005 and 2006 ELA and mathematics curriculum-test content alignment study have been prepared. In the first 19 tables we have provided specific references in the footnotes for locating the information that we used in producing the tables. Tables 20 and 21 contain statistics that are based upon our analyses of information provided in Tables 13 to 19. The target number of score points for each content strand in the ELA and mathematics tests for 2001 to 2006 is found in the MCAS Technical Manuals at the Massachusetts Department of Education web-site (www.doe.mass.edu).

What follows are the main findings:

1. Tables 1 to 5 lay out the test specifications around the content specifications for the tests (ELA, grades 4, 7, and 10) and (Mathematics, grades 4, 6, 8, and 10). The few modifications that have been made over the years are offered as footnotes. There are only a couple of footnotes. We have updated the tables (see, Hambleton & Zhao, 2004, 2005) by including the 2005 and 2006 information.
2. Tables 6 to 12 provide a comparison of actual test content characteristics to the test specifications since 2001. ELA test comparisons appear in Tables 6 to 8 and mathematics test comparisons appear in Tables 9 to 12. We built these tables for earlier alignment study reports in 2004 and 2005 (Hambleton & Zhao, 2004, 2005). Using a 5% level of tolerance permitted by the state, the tests constructed for administrations in 2005 and 2006 were very much in line with the content specifications. A shift of as little as one point in one or two of the content categories would probably bring the actual distribution of score points in the content categories exactly in line with the target specifications. All the tests met the 5% tolerance level. In the grades 4, 7, and 10 ELA tests, the biggest discrepancy between the target percentage of score points in a content strand and the actual percentage was only 2.7% (at grade 7). In the grades 4, 6, 8, and 10 mathematics tests, the biggest discrepancy was only 3.3% (at grade 10).
3. Tables 13 to 19 (information for years 2005 and 2006 is new) provide the number of items and the number of points assessing each Learning Standard (LS) each year on each of the ELA and mathematics tests since 2001. At the bottom of each column (corresponding to year) in each table is the % of LS that are measured. This same information is displayed in Figures 1 and 2 for ELA and in Figures 3 and 4 for mathematics.
4. Figures 1 to 4 may be especially interesting for the assessment development committees. Figures 1 and 2 for ELA and Figures 3 and 4 for mathematics show the % of LS measured each year since 2001. This information has descriptive value for the assessment development committees. We could imagine that an assessment development committee may want to keep these percentages relatively stable over time, but there is no requirement in good test development practices, or even NCLB, that these percentages be stable, and certainly it is not realistic to expect these numbers to be 100% because it is not possible in broad curricula like those being used in Massachusetts, and with limits on testing time, to measure all LS each year. Certainly there is no expectation that these percentages should be 100% or that they should even be high. In ELA, it is actually possible to keep the % of LS relatively high because the number of LS is fairly low (16 to 18). In mathematics, and with more than double the number of LS by grade, the % of LS cannot be expected, in general, to be as high as ELA.

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5. In contrast to Figures 1 to 4, Tables 20 and 21 and Figures 5 to 8 are not only interesting, but they are critically important too. It is important to demonstrate that over multiple years all or nearly all of the LS are assessed. Arbitrarily, we chose a three year interval. In ELA, over three year spans (2001 to 2003, 2002 to 2004, 2003 to 2005, and 2004 to 2006), the percent of LSs assessed is close to 100%. This is highly desirable. For the last two years, the percentage of LS measured over a three year period in ELA at grades 4, 7, and 10, is 100%. In mathematics, the numbers for the same time periods are also very high. In the most recent interval, 2004-2006, these percentages are 95.1%, 97.5%, 94.4%, and 92.6%, for grades 4, 6, 8, and 10, respectively.

Conclusions

The evidence reported in the previous section suggests that curriculum-test alignment for the 2005 and 2006 grade 4, 7, and 10 ELA tests and grades 4, 6, 8, and 10 mathematics tests is high. Tables 6 to 12 show clearly that the actual distribution of test content across the content strands is within the 5% tolerance that is allowed by the state and professional standards. Also, using the contents of Tables 13 to 19, Tables 20 and 21 highlight the very high percentage of LS being measured over the last three year period (2004 to 2006). It is 100% of the LS in ELA, and over 92% of the LS in mathematics. Assessment of just two or three of the non-assessed learning standards in any one of the last three years (at some grades the number is two, and at one grade, the number is three) would have pushed the percentage of learning standards assessed over a three year period in mathematics to 100%. Our conclusion is that the grades 4, 7, and 10 ELA and grades 4, 6, 8, and 10 mathematics tests have high curriculum-test alignment.

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Final Version: November 10, 2006

Table 1

Approximate Distribution of Grades 4, 7, and 10 English Language Arts Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 72) |
|------------------------|-----------------------------------|
| Language | 8% (6 points) |
| Reading and Literature | 64% (46 points) |
| Composition | 28% (20 points) |

See Massachusetts Department of Education (2006h) for the basic information in the table.

Table 2

Approximate Distribution of Grade 4 Mathematics Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 54) |
|---------------------------------|-----------------------------------|
| Data Analysis, Statistics, etc. | 20% (11 points) |
| Geometry | 12.5% (6.5 points) |
| Measurement | 12.5% (6.5 points) |
| Number Sense and Operations | 35% (19 points) |
| Patterns, etc. | 20% (11 points) |

In 2001, the Geometry and Measurement strand was split into two strands, with the same combined portion of the assessment (i.e., 25%).

See Massachusetts Department of Education (2006i) for the basic information in the table.

Table 3

Approximate Distribution of Grade 6 Mathematics Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 54) |
|---------------------------------|-----------------------------------|
| Data Analysis, Statistics, etc. | 15% (8 points) |
| Geometry | 13% (7 points) |
| Measurement | 13% (7 points) |
| Number Sense and Operations | 33% (18 points) |
| Patterns, etc. | 26% (14 points) |

In 2001, the Geometry and Measurement strand was split into two strands, with the same combined portion of the test (i.e., 26%).

See Massachusetts Department of Education (2006i) for the basic information in the table.

Table 4

Approximate Distribution of Grade 8 Mathematics Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 54) |
|---------------------------------|-----------------------------------|
| Data Analysis, Statistics, etc. | 20% (11 points) |
| Geometry | 13% (7 points) |
| Measurement | 13% (7 points) |
| Number Sense and Operations | 26% (14 points) |
| Patterns, etc. | 28% (15 points) |

In 2001, the Geometry and Measurement strand was split into two strands, with the same combined portion of the test (i.e., 26%).

See Massachusetts Department of Education (2006i) for the basic information in the table.

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Table 5

Approximate Distribution of Grade 10 Mathematics Score Points Across Content Strands

| Content Strand | Target % of Total Points (n = 60) |
|---------------------------------|-----------------------------------|
| Data Analysis, Statistics, etc. | 20% (12 points) |
| Geometry | 15% (9 points) |
| Measurement | 15% (9 points) |
| Number Sense And Operations | 20% (12 points) |
| Patterns, etc. | 30% (18 points) |

In 2001, the Geometry and Measurement strand was split into two strands, with the same combined portion of the test (i.e., 30%).

See Massachusetts Department of Education (2006i) for the basic information in the table.

Table 6

Grade 4 English Language Arts Content Strands
(Percent of Total Points/Number of Points)

| Strand Standards | Target % | Actual Distribution | | | | | |
|----------------------|----------|---------------------|-------------|-------------|-------------|-------------|-------------|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Language 4-6 | 8% | 12.5% 9 | 12.5% 9 | 6.9% 5 | 5.6% 4 | 6.9% 5 | 9.7% 7 |
| Read/Lit. 8-17 | 64% | 59.7% 43 | 59.7% 43 | 65.3% 47 | 66.7% 48 | 65.3% 47 | 62.5% 45 |
| Composition 19-23 | 28% | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 |
| TOTAL | 100% | 72 | 72 | 72 | 72 | 72 | 72 |

See Massachusetts Department of Education (2006h), Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005a, June) and Massachusetts Department of Education. (2006a, June) for the basic information in the table.

Table 7

Grade 7 English Language Arts Content Strands
(Percent of Total Points/Number of Points)

| Strand Standards | Target % | Actual Distribution | | | | | |
|----------------------|----------|---------------------|-------------|-------------|-------------|-------------|-------------|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Language 4-6 | 8% | 11.1% 8 | 8.3% 6 | 9.7% 7 | 6.9% 5 | 9.7% 7 | 5.5% 4 |
| Read/Lit. 8-17 | 64% | 61.1% 44 | 63.9% 46 | 62.5% 45 | 65.3% 47 | 62.5% 45 | 66.7% 48 |
| Composition 19-23 | 28% | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 |
| TOTAL | 100% | 72 | 72 | 72 | 72 | 72 | 72 |

See Massachusetts Department of Education. (2006h), Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005b, June) and Massachusetts Department of Education. (2006b, June) for the basic information in the table.

Table 8

Grade 10 English Language Arts Content Strands
(Percent of Total Points/Number of Points)

| Strand Standards | Target % | Actual Distribution | | | | | |
|-------------------|----------|---------------------|-------------|-------------|-------------|-------------|-------------|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Language 4-6 | 8% | 9.9% 7 | 9.7% 7 | 11.1% 8 | 6.9% 5 | 8.3% 6 | 8.3% 6 |
| Read/Lit. 8-17 | 64% | 62.0% 44 | 62.5% 45 | 61.1% 44 | 65.3% 47 | 63.9% 46 | 63.9% 46 |
| Composition 19-23 | 28% | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 | 27.8% 20 |
| TOTAL | 100% | 72 | 72 | 72 | 72 | 72 | 72 |

See References Massachusetts Department of Education. (2006h), Hambleton, R. K., & Zhao, Y. (2004), Massachusetts Department of Education. (2005c, June) and Massachusetts Department of Education. (2006c, June) for the basic information in the table.

Table 9

Grade 4 Mathematics Content Strands
(Percent of Total Points/Number of Points)

| Strand | Target % | Actual Distribution | | | | | |
|---------------------------------|----------|---------------------|-------------|-------------|-------------|-------------|-------------|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Data Analysis, Statistics, etc. | 20% | 20.4% 11 | 18.5% 10 | 18.5% 10 | 18.5% 10 | 18.5% 10 | 20.4% 11 |
| Geometry | 12.5% | 14.8% 8 | 14.8% 8 | 14.8% 8 | 14.8% 8 | 13% 7 | 11.1% 6 |
| Measurement | 12.5% | 11.1% 6 | 13% 7 | 13% 7 | 13% 7 | 14.8% 8 | 13% 7 |
| Number Sense and Operations | 35% | 33.3% 18 | 33.3% 18 | 33.3% 18 | 33.3% 18 | 33.3% 18 | 35.2% 19 |
| Patterns, etc. | 20% | 20.4% 11 | 20.4% 11 | 20.4% 11 | 20.4% 11 | 20.4% 11 | 20.4% 11 |
| TOTAL | 100% | 54 | 54 | 54 | 54 | 54 | 54 |

See Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005d, June), Massachusetts Department of Education. (2006d, June) and Massachusetts Department of Education (2006i) for the basic information in the table.

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Table 10

Grade 6 Mathematics Content Strands
(Percent of Total Points/Number of Points)

| Strand | Target % | Actual Distribution | | | | | |
|---------------------------------|-------------|---------------------|-------------|-------------|-------------|-------------|-------------|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Data Analysis, Statistics, etc. | 15% | 13% 7 | 14.8% 8 | 16.7% 9 | 16.7% 9 | 14.8% 8 | 14.8% 8 |
| Geometry | 13% | 13% 7 | 9.3% 5 | 14.8% 8 | 13% 7 | 14.8% 8 | 13% 7 |
| Measurement | 13% | 14.8% 8 | 18.5% 10 | 16.7% 9 | 14.8% 8 | 13% 7 | 13% 7 |
| Number Sense and Operations | 33% | 27.8% 15 | 31.5% 17 | 25.9% 14 | 27.8% 15 | 31.5% 17 | 33.3% 18 |
| Patterns, etc. | 26% | 31.5% 17 | 25.9% 14 | 25.9% 14 | 27.8% 15 | 25.9% 14 | 25.9% 14 |
| TOTAL | 100% | 54 | 54 | 54 | 54 | 54 | 54 |

See Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005e, June), Massachusetts Department of Education. (2006e, June) and Massachusetts Department of Education (2006i) for the basic information in the table.

Table 11

Grade 8 Mathematics Content Strands
(Percent of Total Points/Number of Points)

| Strand | Target % | Actual Distribution | | | | | |
|---------------------------------|-------------|---------------------|-------------|-------------|-------------|-------------|-------------|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Data Analysis, Statistics, etc. | 20% | 20.4% 11 | 20.4% 11 | 20.4% 11 | 18.5% 10 | 18.5% 10 | 20.4% 11 |
| Geometry | 13% | 16.7% 9 | 13% 7 | 13% 7 | 5.6% 3 | 11.1% 6 | 13% 7 |
| Measurement | 13% | 5.6% 3 | 13% 7 | 13% 7 | 20.4% 11 | 14.8% 8 | 13% 7 |
| Number Sense and Operations | 26% | 25.9% 14 | 22.2% 12 | 23.7% 13 | 27.8% 15 | 27.8% 15 | 25.9% 14 |
| Patterns, etc. | 28% | 31.5% 17 | 31.5% 17 | 29.7% 16 | 27.8% 15 | 27.8% 15 | 27.8% 15 |
| TOTAL | 100% | 54 | 54 | 54 | 54 | 54 | 54 |

See Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005f, June), Massachusetts Department of Education. (2006f, June) and Massachusetts Department of Education (2006i) for the basic information in the table.

Table 12

Grade 10 Mathematics Content Strands
(Percent of Total Points/Number of Points)

| Strand | Target % | Actual Distribution | | | | | |
|---------------------------------|-------------|---------------------|-------------|-----------|-------------|-------------|-------------|
| | | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| Data Analysis, Statistics, etc. | 20% | 18.6% 11 | 20% 12 | 20% 12 | 20% 12 | 23.3% 14 | 16.7% 10 |
| Geometry | 15% | 16.9% 10 | 13.3% 8 | 15% 9 | 15% 9 | 15% 9 | 15% 9 |
| Measurement | 15% | 11.9% 7 | 15% 9 | 15% 9 | 13.3% 8 | 15% 9 | 16.7% 10 |
| Number Sense and Operations | 20% | 20.3% 12 | 20% 12 | 20% 12 | 21.7% 13 | 20% 12 | 21.7% 13 |
| Patterns, etc. | 30% | 32.2% 19 | 31.7% 19 | 30% 18 | 30% 18 | 26.7% 16 | 30% 18 |
| TOTAL | 100% | 59 | 60 | 60 | 60 | 60 | 60 |

See Hambleton, R. K., & Zhao, Y. (2004), Massachusetts Department of Education. (2005g, June), Massachusetts Department of Education. (2006g, June) and Massachusetts Department of Education (2006i) for the basic information in the table.

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Table 13

Grade 4 English Language Arts Learning Standards (18)
(Number of Items/Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year | | | | | |
|---------------------------|-------|-------|-------|-------|-------|-------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 4 | 4/4 | 4/4 | 3/3 | 2/2 | 3/3 | 4/4 |
| 5 | 5/5 | 5/5 | 2/2 | 2/2 | 2/2 | 3/3 |
| 6 | X | X | X | X | X | X |
| 8 | 9/9 | 8/14 | 16/25 | 12/18 | 16/22 | 9/9 |
| 9 | X | X | X | 1/1 | X | X |
| 10 | 4/4 | 3/3 | 3/3 | 1/1 | 2/2 | 2/2 |
| 11 | | | 2/2 | 5/8 | ¼ | |
| 12 | 6/12 | 7/13 | 4/4 | 3/3 | 5/5 | 11/14 |
| 13 | 9/15 | 6/6 | 5/5 | 5/8 | 4/7 | 6/12 |
| 14 | | 3/3 | 2/5 | 1/1 | 2/2 | 2/5 |
| 15 | 3/3 | 4/4 | 3/3 | 6/6 | 2/2 | 3/3 |
| 16 | | | | | 1/1 | |
| 17 | | | | 2/2 | 2/2 | |
| 19-23 | 1/20 | 1/20 | 1/20 | 1/20 | 1/20 | 1/20 |
| TOTAL | 41/72 | 41/72 | 41/72 | 41/72 | 41/72 | 41/72 |
| % of LS Assessed | 75.0 | 81.3 | 87.5 | 93.8 | 100.0 | 81.3 |

Note: Learning standards 1, 2, 3, 7, 18, and 24 to 27 are not included in the annual MCAS assessments, and instead, they are assessed by teachers at the classroom level.

Learning standards 6 (formal and informal English) and 9 (making connections) are rarely included in the annual MCAS assessments because of their nature, but occasionally they are assessed. In the 2004 assessment, one item worth one point assessed learning standard 9. They are normally assessed by teachers at the classroom level. These learning standards are not included in the % of LS assessed calculation above.

Learning standards 14, 16, and 17 associated with poetry, myths and traditions, and drama, respectively, are sometimes included in the assessments and other times the genres are used in assessing other learning standards.

See Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005a, June) and Massachusetts Department of Education. (2006a, June) for the basic information in the table.

Table 14

Grade 7 English Language Arts Learning Standards (18)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year | | | | | |
|---------------------------|-------|-------|-------|-------|-------|-------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 4 | 3/3 | 3/3 | 3/3 | 4/4 | 4/4 | 4/4 |
| 5 | 5/5 | 3/3 | 4/4 | 1/1 | 3/3 | |
| 6 | X | X | X | X | X | X |
| 8 | 7/7 | 5/5 | 11/14 | 14/17 | 10/13 | 5/5 |
| 9 | X | X | X | X | X | X |
| 10 | 3/3 | 2/2 | 1/1 | 2/2 | | |
| 11 | 2/2 | 1/1 | 1/1 | | | 3/3 |
| 12 | 2/5 | 10/13 | 6/9 | 3/3 | 1/4 | 7/10 |
| 13 | 7/13 | 8/14 | 6/9 | 8/14 | 10/13 | 11/17 |
| 14 | 2/5 | 4/7 | 2/5 | 3/3 | 3/6 | 2/2 |
| 15 | 6/6 | 4/4 | 1/1 | 1/4 | 3/3 | 3/3 |
| 16 | 3/3 | | 2/2 | 2/2 | 2/2 | 5/8 |
| 17 | | | 3/3 | 2/2 | 4/4 | |
| 19-23 | 1/20 | 1/20 | 1/20 | 1/20 | 1/20 | 1/20 |
| TOTAL | 41/72 | 41/72 | 41/72 | 41/72 | 41/72 | 41/72 |
| % of LS Assessed | 93.8 | 87.5 | 100.0 | 93.8 | 87.5 | 81.3 |

Note: Learning standards 1, 2, 3, 7, 18, and 24 to 27 are not included in the annual MCAS assessments, and instead, they are assessed by teachers at the classroom level.

Learning standards 6 (formal and informal English) and 9 (making connections) are rarely included in the annual MCAS assessments because of their nature, but occasionally they are assessed. They are normally assessed by teachers at the classroom level. These learning standards are not included in the % of LS assessed calculation above.

Learning standards 14, 16, and 17 associated with poetry, myths and traditions, and drama, respectively, are sometimes included in the assessments and other times the genres are used in assessing other learning standards.

See Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005b, June) and Massachusetts Department of Education. (2006b, June) for the basic information in the table.

Appendix M

Table 15

Grade 10 English Language Arts Learning Standards (18)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year | | | | | |
|---------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 4 | 5/5 | 4/4 | 6/6 | 2/2 | 4/4 | 4/4 |
| 5 | 2/2 | 3/3 | 1/1 | 3/3 | 1/1 | 1/1 |
| 6 | X | X | 1/1 | X | 1/1 | 1/1 |
| 8 | 4/4 | 5/5 | 3/3 | 6/6 | 10/10 | 5/5 |
| 9 | X | 1/1 | X | X | X | X |
| 10 | 2/2 | | 2/2 | 1/1 | | |
| 11 | 1/1 | | | 1/4 | | |
| 12 | 8/14 | 3/6 | 6/9 | 5/8 | 5/8 | 7/7 |
| 13 | 7/10 | 13/22 | 9/15 | 10/13 | 5/11 | 11/17 |
| 14 | 4/7 | 3/3 | 6/9 | 2/2 | 5/8 | 4/4 |
| 15 | 6/6 | 4/4 | 3/3 | 7/10 | 7/7 | 2/5 |
| 16 | | | | | 2/2 | |
| 17 | | 4/4 | 3/3 | 3/3 | | 5/8 |
| 19-23 | 1/20 | 1/20 | 1/20 | 1/20 | 1/20 | 1/20 |
| TOTAL | 40/71 | 41/72 | 41/72 | 41/72 | 41/72 | 41/72 |
| % of LS Assessed | 87.5 | 81.3 | 87.5 | 93.8 | 81.3 | 81.3 |

Note: Learning standards 1, 2, 3, 7, 18, and 24 to 27 are not included in the annual MCAS assessments, and instead, they are assessed by teachers at the classroom level.

Learning standards 6 (formal and informal English) and 9 (making connections) are rarely included in the annual MCAS assessments because of their nature, but occasionally they are assessed. They are normally assessed by teachers at the classroom level. These learning standards are not included in the % of LS assessed calculation above.

Learning standards 14, 16, and 17 associated with poetry, myths and traditions, and drama, respectively, are sometimes included in the assessments and other times the genres are used in assessing other learning standards.

See Hambleton, R. K., & Zhao, Y. (2004), Massachusetts Department of Education. (2005c, June) and Massachusetts Department of Education. (2006c, June) for the basic information in the table.

Table 16
Grade 4 Mathematics Learning Standards (44)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year | | | | | |
|------------------------|-------|-------|-------|-------|-------|-------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 4.D.1 | | | 1/1 | 1/1 | | 1/1 |
| 4.D.2 | | | 2/5 | 1/1 | 1/1 | 1/1 |
| 4.D.3 | 6/9 | 4/4 | 1/1 | 2/5 | 2/2 | 4/7 |
| 4.D.4 | | 2/2 | | 2/2 | 2/5 | 1/1 |
| 4.D.5 | 1/1 | 1/4 | 2/2 | 1/1 | 1/1 | |
| 4.D.6 | 1/1 | | 1/1 | | 1/1 | 1/1 |
| 4.G.1 | | 1/4 | 1/1 | 1/1 | | |
| 4.G.2 | 1/1 | | | 1/4 | 2/2 | 1/1 |
| 4.G.3 | X | X | 1/1 | X | X | X |
| 4.G.4 | 1/1 | | | | | |
| 4.G.5 | | 1/1 | 1/1 | 1/1 | 1/4 | 1/1 |
| 4.G.6 | 1/1 | 1/1 | 1/4 | | | 1/4 |
| 4.G.7 | 1/1 | | | | | |
| 4.G.8 | 1/4 | 1/1 | 1/1 | 1/1 | 1/1 | |
| 4.G.9 | | 1/1 | | 1/1 | | |
| 4.M.1 | | | | | 1/1 | |
| 4.M.2 | | 1/1 | 1/1 | 1/1 | | 1/1 |
| 4.M.3 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| 4.M.4 | 1/4 | 1/4 | 1/4 | 1/4 | 2/5 | 1/4 |
| 4.M.5 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| 4.N.1 | | | 1/1 | 1/1 | 2/2 | 1/1 |
| 4.N.2 | 2/2 | 1/1 | 1/1 | 1/1 | | |
| 4.N.3 | 1/1 | 4/4 | 1/1 | 1/1 | 2/2 | 1/1 |
| 4.N.4 | 3/3 | 1/1 | 2/2 | | | 1/1 |
| 4.N.5 | 1/1 | | 1/1 | | 1/1 | 1/1 |
| 4.N.6 | | | 1/1 | 1/1 | 1/1 | |
| 4.N.7 | | 1/1 | | 2/5 | 1/1 | 2/2 |
| 4.N.8 | 1/1 | | 1/1 | 1/1 | 1/1 | 1/1 |
| 4.N.9 | 1/1 | 1/1 | 1/1 | | 1/4 | 1/1 |
| 4.N.10 | 3/6 | 3/6 | 3/3 | 3/3 | 1/1 | 2/5 |
| 4.N.11 | | | | 1/1 | 1/1 | 1/1 |
| 4.N.12 | 1/1 | | 1/1 | 2/2 | 1/1 | 1/1 |
| 4.N.13 | | 2/2 | | | 1/1 | 1/1 |
| 4.N.14 | X | X | X | X | X | X |
| 4.N.15 | X | X | X | X | X | X |
| 4.N.16 | 1/1 | 1/1 | | | 1/1 | 1/1 |
| 4.N.17 | 1/1 | 1/1 | 1/4 | 2/2 | | 1/1 |
| 4.N.18 | | | 1/1 | | 1/1 | 1/1 |
| 4.P.1 | 1/1 | 3/3 | 3/6 | 1/1 | 2/5 | 3/3 |
| 4.P.2 | 1/1 | | | 1/1 | 1/1 | |
| 4.P.3 | 2/2 | 3/3 | 2/2 | 1/1 | 1/1 | 2/2 |
| 4.P.4 | 3/3 | | 1/1 | 1/1 | 1/1 | 1/1 |
| 4.P.5 | 1/4 | 2/5 | 1/1 | 2/5 | 2/2 | 1/4 |
| 4.P.6 | | | 1/1 | 2/2 | 1/1 | 1/1 |
| TOTAL | 39/54 | 39/54 | 39/54 | 39/54 | 39/54 | 39/54 |
| % of LS Assessed | 63.4 | 58.5 | 73.2 | 73.2 | 75.6 | 75.6 |

Learning standards 4.N.14 and 4.N.15 are in the mathematics curriculum but are written for classroom demonstration only. Learning standard 4.G.3 is rarely included in the test because of the difficulty of using grade-level appropriate vocabulary. It, too, is assessed at the classroom level.

See Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005d, June) and Massachusetts Department of Education. (2006d, June) for the basic information in the table.

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Table 17
Grade 6 Mathematics Learning Standards (42)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year | | | | | |
|------------------------|-------|-------|-------|-------|-------|-------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 6.D.1 | 1/1 | 1/4 | 2/5 | 2/5 | 2/2 | 1/4 |
| 6.D.2 | | 2/2 | 1/1 | 2/2 | 1/1 | 1/1 |
| 6.D.3 | 1/1 | | 1/1 | 1/1 | 1/1 | 1/1 |
| 6.D.4 | 2/5 | 2/2 | 2/2 | 1/1 | 1/4 | 2/2 |
| 6.G.1 | 2/5 | 1/1 | | 1/4 | 1/1 | |
| 6.G.3 | | 1/1 | 1/1 | 1/1 | 1/1 | |
| 6.G.4 | | | 1/4 | | 2/5 | |
| 6.G.5 | | 1/1 | | | 1/1 | 1/1 |
| 6.G.6 | 1/1 | | 1/1 | | | 1/1 |
| 6.G.7 | | | 1/1 | 1/1 | | 1/1 |
| 6.G.8 | 1/1 | 1/1 | | 1/1 | | 1/4 |
| 6.G.9 | | 1/1 | 1/1 | | | |
| 6.M.1 | 2/2 | 1/1 | 1/4 | | | 2/5 |
| 6.M.2 | 2/2 | | | 1/1 | | |
| 6.M.3 | 1/1 | 2/2 | 1/1 | 1/1 | | |
| 6.M.4 | 1/1 | 2/5 | 2/2 | | 2/2 | 1/1 |
| 6.M.5 | 1/1 | 1/1 | 1/1 | 1/4 | 1/1 | |
| 6.M.6 | 1/1 | | 1/1 | 1/1 | 1/4 | 1/1 |
| 6.M.7 | | 1/1 | | 1/1 | | |
| 6.N.1 | 2/2 | | 1/1 | 1/1 | 1/1 | |
| 6.N.2 | | | 1/1 | | 1/1 | 1/1 |
| 6.N.3 | | | 1/1 | 1/1 | | 1/1 |
| 6.N.4 | 2/2 | 2/2 | 1/1 | | 1/1 | 1/1 |
| 6.N.5 | 1/1 | | | 1/1 | 2/5 | 2/2 |
| 6.N.6 | | 2/5 | | 1/1 | 1/1 | 1/1 |
| 6.N.7 | | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| 6.N.8 | 2/2 | 2/2 | 2/2 | 1/1 | | 2/5 |
| 6.N.9 | 4/7 | 2/5 | 1/1 | 3/6 | 1/1 | 2/2 |
| 6.N.10 | | 1/1 | 1/1 | 1/1 | | 1/1 |
| 6.N.11 | | 1/1 | | 1/1 | 1/1 | |
| 6.N.12 | | | | 1/1 | 1/1 | |
| 6.N.13 | | | 1/4 | | 1/1 | |
| 6.N.14 | X | X | X | X | X | 1/1 |
| 6.N.15 | X | X | X | X | 1/1 | 1/1 |
| 6.N.16 | 1/1 | | 1/1 | | 2/2 | 1/1 |
| 6.P.1 | 4/4 | 2/5 | 3/6 | 1/1 | 2/2 | 1/1 |
| 6.P.2 | 1/1 | 3/3 | 2/2 | 2/2 | 2/2 | 2/2 |
| 6.P.3 | 3/6 | | 1/1 | 1/1 | 1/1 | 1/1 |
| 6.P.4 | ¼ | | 2/2 | 3/3 | 4/7 | 2/2 |
| 6.P.5 | 2/2 | 3/3 | 2/2 | 3/6 | 1/1 | 1/1 |
| 6.P.6 | | 2/2 | | 1/1 | 1/1 | 3/6 |
| 6.P.7 | | 1/1 | 1/1 | 1/1 | | 1/1 |
| TOTAL | 39/54 | 39/54 | 39/54 | 39/54 | 39/54 | 39/54 |
| % of LS Assessed | 57.5 | 62.5 | 75.0 | 75.0 | 70.0 | 70.0 |

See Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005e, June) and Massachusetts Department of Education. (2006e, June) for the basic information in the table.

Table 18
Grade 8 Mathematics Learning Standards (43)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year | | | | | |
|------------------------|-------|-------|-------|-------|-------|-------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 8.D.1 | X | X | 1/1 | X | X | X |
| 8.D.2 | ¼ | 3/3 | 3/6 | 4/7 | 3/3 | 5/8 |
| 8.D.3 | 1/1 | 1/1 | 3/3 | 1/1 | 3/6 | 2/2 |
| 8.D.4 | 3/6 | 2/5 | 1/1 | 2/2 | 1/1 | 1/1 |
| 4.D.4 | X | 2/2 | X | X | X | X |
| 8.G.1 | | 1/4 | 1/1 | 1/1 | | |
| 8.G.2 | | | 1/1 | 1/1 | | 2/2 |
| 8.G.3 | | 1/1 | 1/4 | | | |
| 8.G.4 | | 1/1 | | | 2/5 | 1/1 |
| 8.G.5 | 1/1 | X | X | X | X | X |
| 8.G.6 | 2/2 | 1/1 | | | 1/1 | ¼ |
| 8.G.7 | | | 1/1 | 1/1 | | |
| 8.G.8 | ¼ | | | | | |
| 6.G.2 | 1/1 | X | X | X | X | X |
| 6.G.5 | 1/1 | X | X | X | X | X |
| 8.M.1 | 1/1 | 1/1 | 1/1 | | 2/2 | 2/2 |
| 8.M.2 | | | 1/1 | | 1/1 | |
| 8.M.3 | 1/1 | 2/5 | 2/5 | 3/9 | 1/4 | 2/5 |
| 8.M.4 | | | | 1/1 | 1/1 | |
| 8.M.5 | | 1/1 | | 1/1 | | |
| 6.M.2 | 1/1 | X | X | X | X | X |
| 8.N.1 | 3/3 | | | 2/2 | 1/1 | 1/1 |
| 8.N.2 | | 1/1 | 1/1 | 1/1 | 1/1 | 1/1 |
| 8.N.3 | 1/1 | | 2/2 | 1/1 | 2/2 | 2/2 |
| 8.N.4 | | | 1/1 | 1/1 | | |
| 8.N.5 | 1/4 | | | 1/1 | 2/2 | 2/2 |
| 8.N.6 | | | | | 1/1 | 1/1 |
| 8.N.7 | 2/2 | 1/1 | | | 1/1 | |
| 8.N.8 | 1/1 | | 1/1 | 1/1 | | |
| 8.N.9 | | 3/6 | 2/2 | 1/1 | 1/1 | |
| 8.N.10 | 3/3 | 4/4 | 2/5 | 2/2 | 3/6 | 3/6 |
| 8.N.11 | X | X | X | X | X | X |
| 8.N.12 | | | 1/1 | 2/5 | | 1/1 |
| 8.P.1 | 3/3 | 5/8 | 4/7 | 3/6 | 3/6 | 1/1 |
| 8.P.2 | | | 1/1 | 1/1 | 1/1 | 3/3 |
| 8.P.3 | | 2/2 | | 1/1 | 1/1 | 1/1 |
| 8.P.4 | 2/2 | | | 1/1 | 1/1 | 3/3 |
| 8.P.5 | | | 2/2 | 1/1 | 1/1 | |
| 8.P.6 | | 1/1 | 1/1 | 1/1 | 1/1 | |
| 8.P.7 | 7/10 | 4/4 | 4/4 | 1/1 | 3/3 | 2/2 |
| 8.P.8 | 1/1 | 1/1 | | 1/1 | | |
| 8.P.9 | | 1/1 | 1/1 | 1/1 | | 1/1 |
| 8.P.10 | 1/1 | | | 1/1 | 1/1 | 1/4 |
| TOTAL | 39/54 | 39/54 | 39/54 | 39/54 | 39/54 | 39/54 |
| % of LS Assessed | 50.0 | 55.6 | 63.9 | 77.8 | 69.4 | 61.1 |

Learning standards 8.N.11, 8.G.5, and 8.D.1 are in the curriculum but not assessed because of complications: the first and third are subjective in their nature, and the second requires special equipment not available during the spring tests.

See Hambleton, R. K., & Zhao, Y. (2005), Massachusetts Department of Education. (2005f, June) and Massachusetts Department of Education. (2006f, June) for the basic information in the table.

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Table 19
Grade 10 Mathematics Learning Standards (35)
(Number of Items/ Number of Points Per Assessment Each Year)

| Learning Standard (LS) | Year | | | | | |
|------------------------|-------|-------|-------|-------|-------|-------|
| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
| 10.D.1 | 3/3 | 4/4 | 5/8 | 6/9 | 10/13 | 6/9 |
| 10.D.2 | 3/6 | 1/1 | 2/2 | | 1/1 | 1/1 |
| 10.D.3 | 2/2 | | | | X | X |
| 8.D.3 | | | | 1/1 | X | X |
| 8.D.4 | | 4/7 | 2/2 | 1/1 | X | X |
| 10.G.1 | | 2/5 | | 1/1 | | 2/2 |
| 10.G.2 | | 1/1 | | | X | X |
| 10.G.3 | | 1/1 | | | 1/1 | |
| 10.G.4 | 2/2 | | 2/2 | 1/1 | | |
| 10.G.5 | 1/1 | 1/1 | | 2/2 | 2/2 | |
| 10.G.6 | 2/2 | | | | 1/1 | 3/6 |
| 10.G.7 | 2/2 | | 2/5 | 1/4 | 2/5 | |
| 10.G.8 | | | | 1/1 | | |
| 10.G.9 | 2/2 | | 2/2 | | | 1/1 |
| 10.G.10 | | | | | | |
| 10.G.11 | 1/1 | | | | | |
| 10.M.1 | 4/7 | 2/2 | 3/3 | 3/3 | 5/8 | 2/5 |
| 10.M.2 | | 3/6 | 2/5 | 2/5 | 1/1 | 3/3 |
| 10.M.3 | | 1/1 | 1/1 | | | 2/2 |
| 10.N.1 | 4/4 | 2/5 | 1/1 | 2/5 | 1/1 | 3/3 |
| 10.N.2 | 2/2 | 2/2 | 1/1 | 3/3 | 3/6 | 6/9 |
| 10.N.3 | 1/1 | 2/2 | 3/3 | 3/3 | 2/2 | 1/1 |
| 10.N.4 | 2/5 | 2/2 | 3/3 | 2/2 | 2/2 | |
| 8.N.2 | | 1/1 | | | X | X |
| 8.N.3 | | | | 1/1 | X | X |
| 8.N.10 | | | | | 1/1 | X |
| 8.N.12 | | | 1/4 | | X | X |
| 10.P.1 | 1/1 | 1/1 | 3/6 | 2/5 | | 4/4 |
| 10.P.2 | | 1/1 | 1/1 | 3/3 | 1/1 | 2/5 |
| 10.P.3 | 1/1 | | 1/1 | 2/2 | 2/2 | 2/2 |
| 10.P.4 | 4/7 | 3/3 | | 1/1 | 1/1 | 1/1 |
| 10.P.5 | | | 1/1 | | | 1/4 |
| 10.P.6 | | 2/2 | | 1/1 | 1/1 | |
| 10.P.7 | 1/4 | 4/10 | 4/4 | 1/1 | 4/7 | 1/1 |
| 10.P.8 | 3/6 | 2/2 | 2/5 | 2/5 | 1/4 | 1/1 |
| TOTAL | 41/59 | 42/60 | 42/60 | 42/60 | 42/60 | 42/60 |
| % of LS Assessed | 54.3 | 60.0 | 57.1 | 62.9 | 66.7 | 66.7 |

Beginning in 2005, learning standards 8.D.3, 8.D.4, 8.N.2, 8.N.3, 8.N.10, and 8.N.12 were no longer candidates for inclusion in the tests. Learning standard 10.G.2 was excluded from the tests beginning in 2005 because geometric tools are not provided, and so assessment is best done at the classroom level. None of these learning standards are included in the calculation of the % of LS Assessed beginning in 2005. Learning standard 10.D.3 was excluded beginning in 2005 and assessed at the classroom level. Research continues to find better ways for assessing this learning standard

See Hambleton, R. K., & Zhao, Y. (2004), Massachusetts Department of Education. (2005g, June) and Massachusetts Department of Education. (2006g, June) for the basic information in the table.

Table 20

Percent of Learning Standards Assessed in English Language Arts
at Grades 4, 7, and 10 in Three-Year Intervals

| Time Period | Grade | | |
|-------------|-------|-------|-------|
| | 4 | 7 | 10 |
| 2001-2003 | 87.5 | 100.0 | 93.8 |
| 2002-2004 | 93.8 | 100.0 | 93.8 |
| 2003-2005 | 100.0 | 100.0 | 100.0 |
| 2004-2006 | 100.0 | 100.0 | 100.0 |

Table 21

Percent of Learning Standards Assessed in Mathematics
at Grades 4, 6, 8, and 10 in Three-Year Intervals

| Time Period | Grade | | | |
|-------------|-------|-------|------|------|
| | 4 | 6 | 8 | 10 |
| 2001-2003 | 95.1 | 97.5 | 94.4 | 85.7 |
| 2002-2004 | 95.1 | 100.0 | 94.4 | 85.7 |
| 2003-2005 | 95.1 | 100.0 | 97.2 | 92.9 |
| 2004-2006 | 95.1 | 97.5 | 94.4 | 92.6 |

Appendix M

Figure 1. Comparison of percent of learning standards assessed in ELA at grades 4, 7, and 10 from 2001 to 2006.

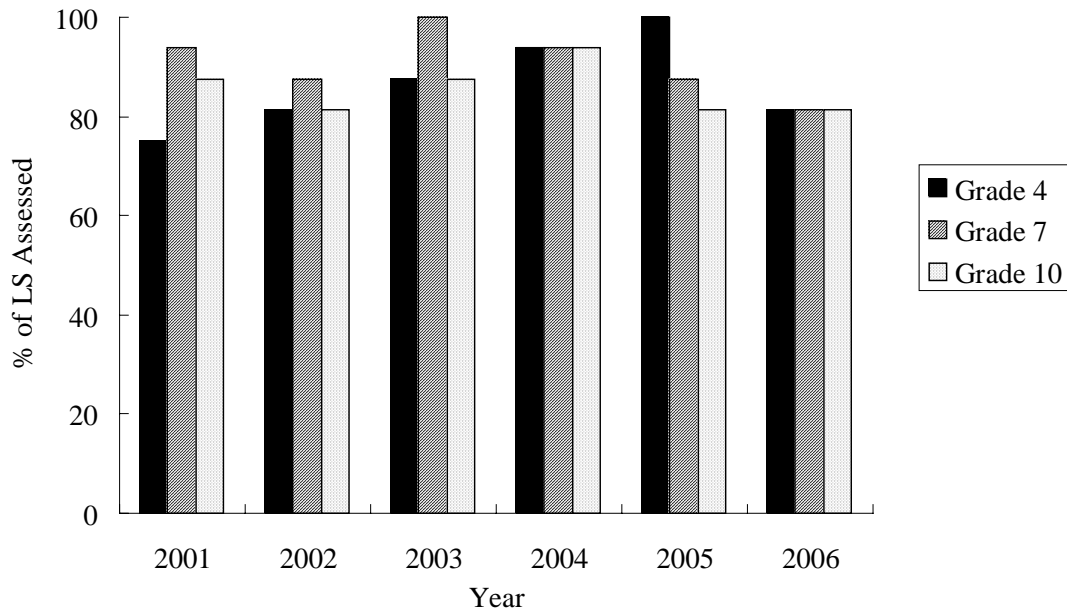


Figure 2. Comparison of percent of learning standards assessed in ELA at grades 4, 7, and 10 from 2001 to 2006.

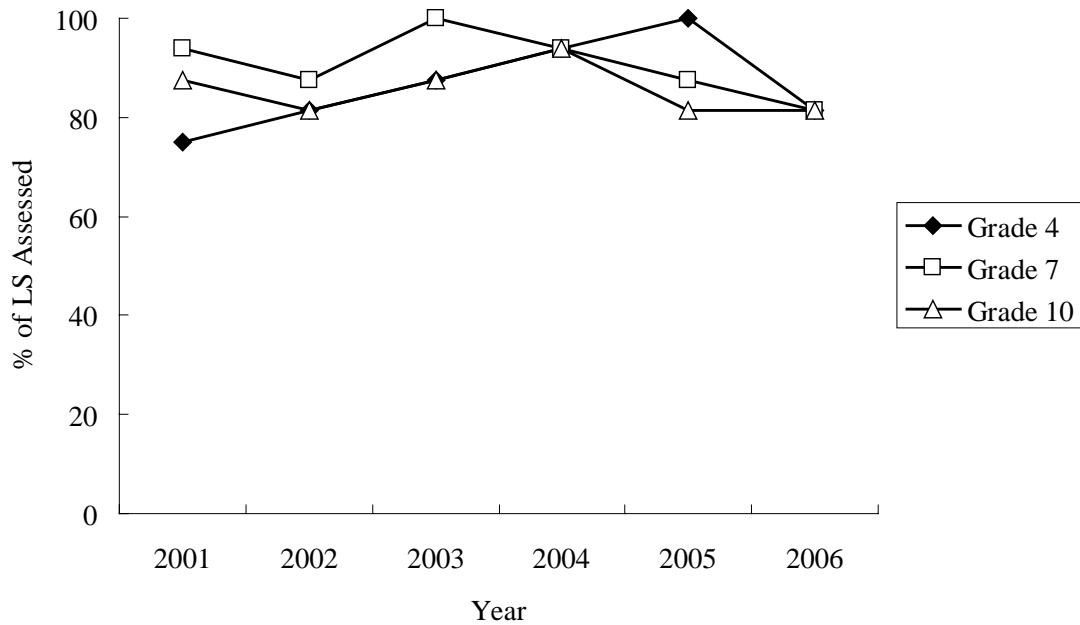


Figure 3. Comparison of percent of learning standards assessed in Mathematics at grade 4, 6, 8, and 10 from 2001 to 2006.

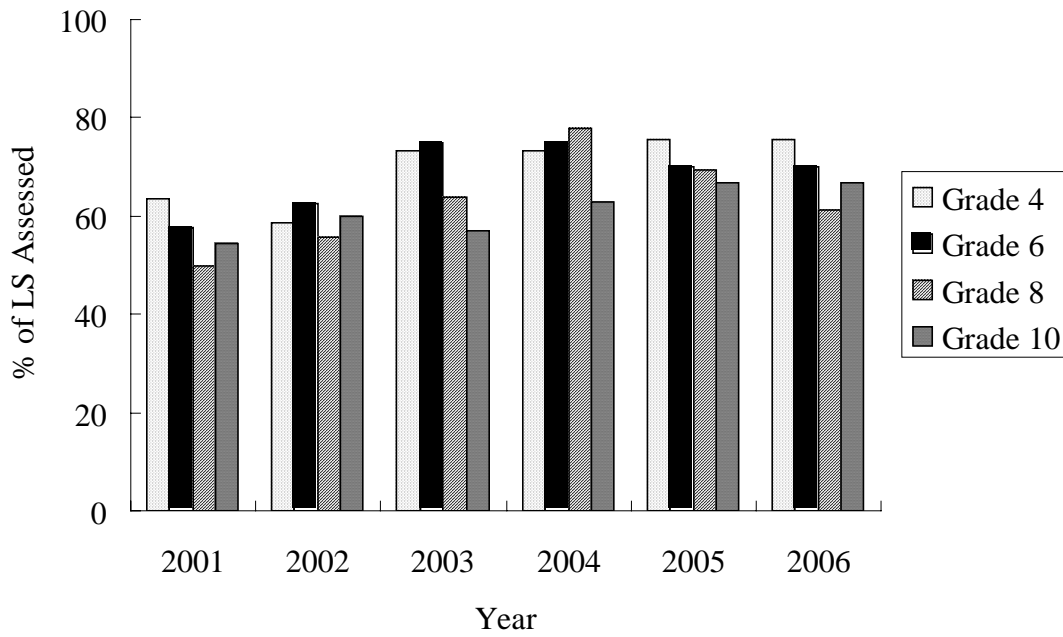
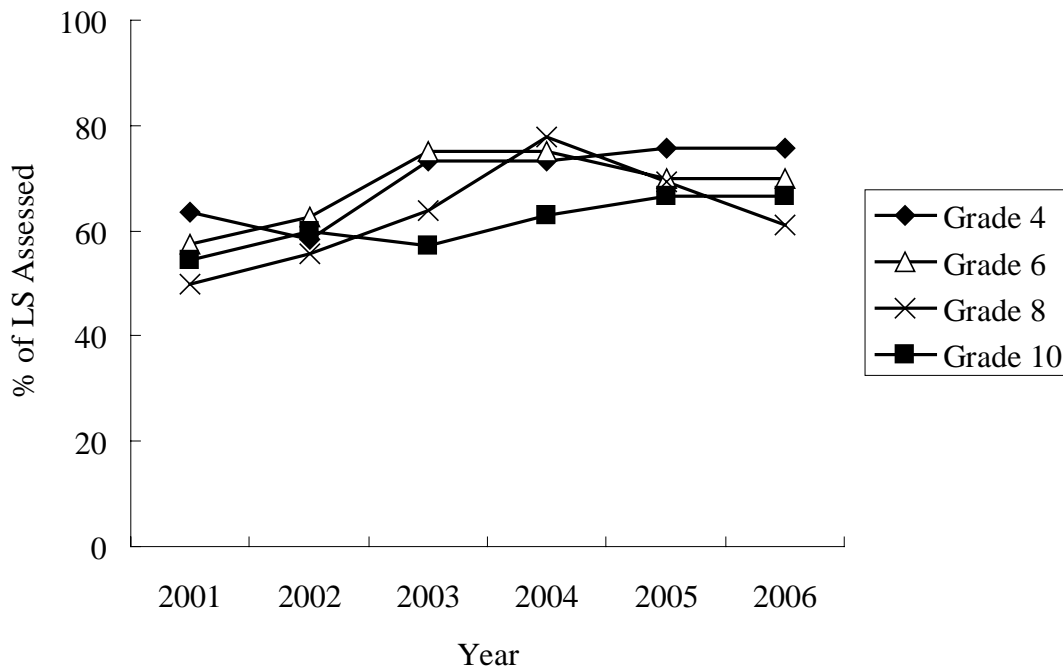


Figure 4. Comparison of percent of learning standards assessed in Mathematics at grade 4, 6, 8, and 10 from 2001 to 2006.



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Figure 5. Percent of learning standards assessed in ELA at grade 4, 7, and 10 in the time periods of 2001 to 2003, 2002 to 2004, 2003 to 2005, and 2004 to 2006.

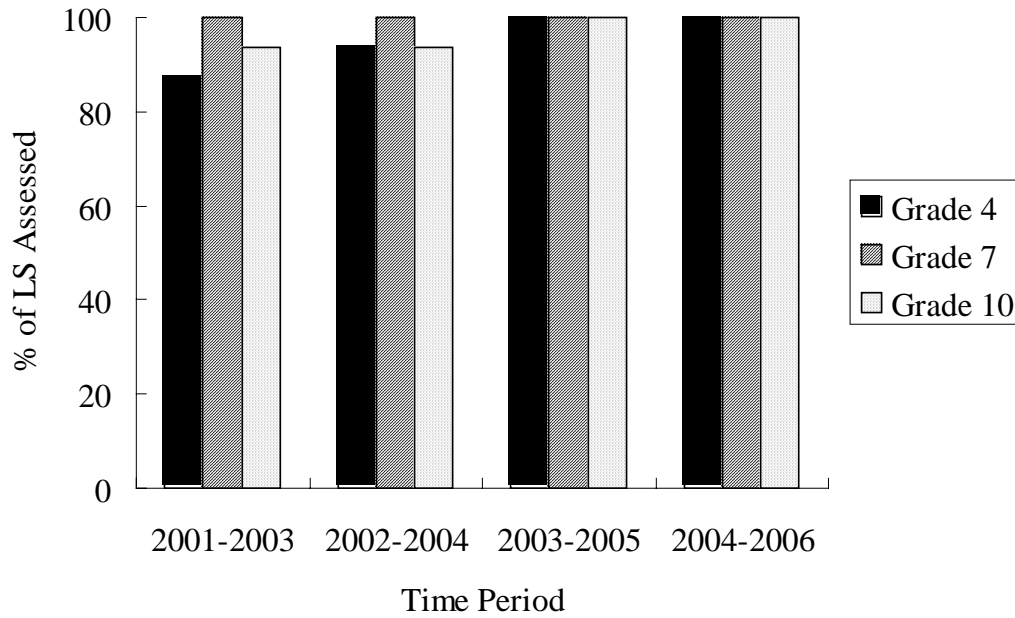


Figure 6. Percent of learning standards assessed in ELA at grade 4, 7, and 10 in the time periods of 2001 to 2003, 2002 to 2004, 2003 to 2005, and 2004 to 2006.

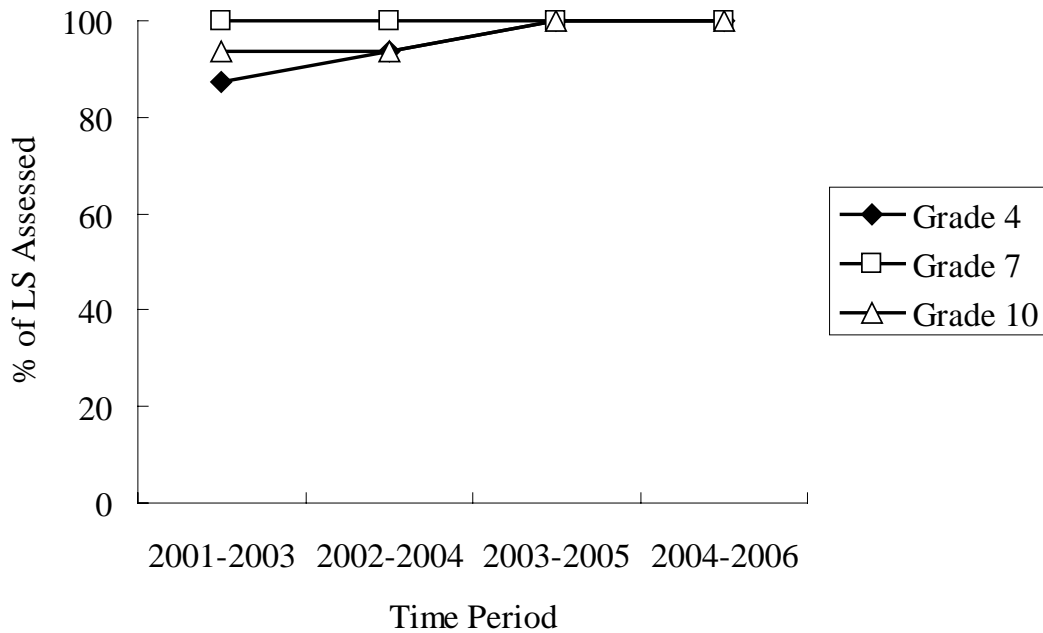


Figure 7. Percent of learning standards assessed in Mathematics at grade 4, 6, 8, and 10 in the time periods of 2001 to 2003, 2002 to 2004, 2003 to 2005, and 2004 to 2006.

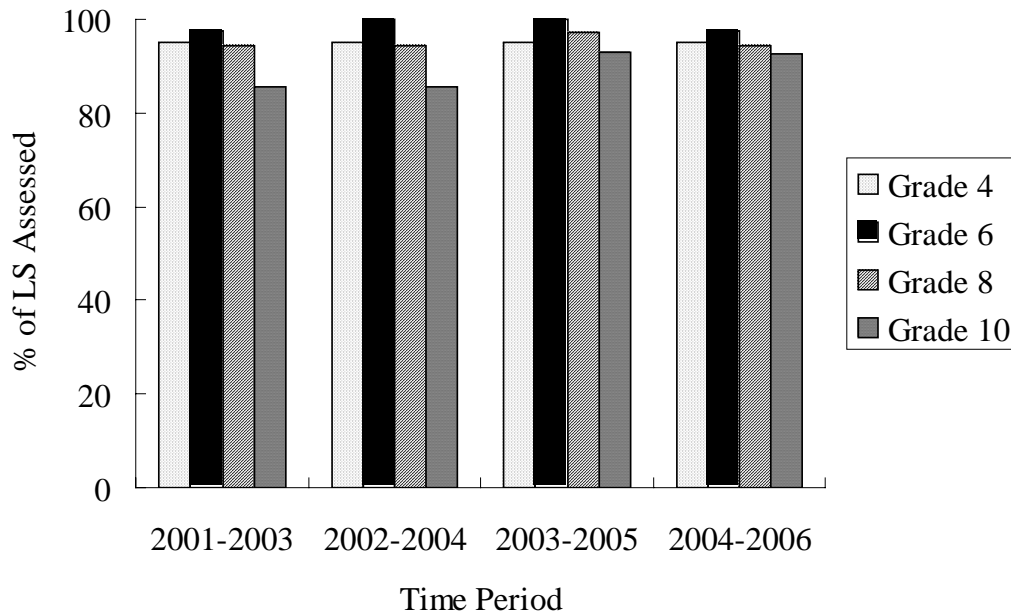


Figure 8. Percent of learning standards assessed in Mathematics at grade 4, 6, 8, and 10 in the time periods of 2001 to 2003, 2002 to 2004, 2003 to 2005, and 2004 to 2006.

