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Technical Brief

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Updating ACT® Aspire® ELA and STEM Readiness Benchmarks for Grades 3-10

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1. Introduction

The ACT College Readiness Benchmarks serve as indicators of readiness for students who take the ACT test, primarily in 11th and 12th grade. They are the ACT scores associated with a 50% chance of earning a B or higher grade in selected first-year credit-bearing courses at a typical postsecondary institution. The Benchmarks were established by linking ACT test scores with grades in first-year college courses from the same subject area. Benchmarks were first established for ACT English, mathematics, reading, and science scores (Allen & Sconing, 2005; Allen, 2013) and have also been established for ACT STEM (Mattern, Radunzel, & Westrick, 2015; Radunzel, Mattern, Crouse, & Westrick, 2015) and ACT ELA scores (Radunzel, Westrick, Bassiri, & Li, 2017).

For grades 3-10, the ACT Readiness Benchmarks are the ACT Aspire scores associated with being "on-target" to meet the ACT College Readiness Benchmarks in the spring of 11th grade.

The ACT Readiness Benchmarks are used as cutoff scores for ACT Aspire's "Ready" level. Benchmarks for grades 3-10 have been established for English, mathematics, reading, science, ELA, and STEM.[1] For English, mathematics, reading, and science, Benchmarks for grades 8-10 were based on the ACT Explore® and ACT Plan® scores associated with a 50% chance of meeting the ACT College Readiness Benchmarks (ACT, 2017). Concordance tables were used to find the ACT Aspire scores corresponding to the ACT Explore and ACT Plan Benchmarks. Statistical moderation (Mislevy, 1992) was then used to set Benchmarks for grades 3-7 that were the same distance from the mean (in standard deviation units) as the grade 8 Benchmarks.

Because an ACT College Readiness Benchmark for ELA did not exist until 2017, the ELA Benchmarks for grades 3-10 were initially set as the average of the Benchmarks for English, reading, and writing. The STEM Benchmarks for grades 3-10 were initially set as the average of the Benchmarks for mathematics and science.[2]

The ACT ELA score was introduced in fall 2015 and is a combination of the ACT English, reading, and writing scores. Consistent with other ACT scores, the ACT ELA score

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ranges between 1 and 36. Recently, a Benchmark for the ACT ELA score was developed (Radunzel et al., 2017). The ACT ELA Benchmark is 20 and is the score associated with a 50% chance of earning a grade of B or higher in seven ELA-related courses taken by first-year college students. The courses include English Composition I, American History, Other History, Psychology, Sociology, Political Science, and Economics.

The ACT STEM score was also introduced in fall 2015 and is the average of the ACT mathematics and science scores. The ACT STEM Benchmark (26) was developed by linking ACT mathematics and science test scores to success in math and science courses commonly taken by students in STEM-related majors. The courses included Calculus, Chemistry, Biology, Physics, and Engineering (Radunzel et al., 2015). Relative to the original Benchmarks for mathematics and science, the ACT STEM Benchmark requires greater mastery of mathematics and science reasoning, reflecting the greater difficulty of the math and science courses taken by students in STEM-related majors.

With the development of the ACT ELA and STEM Benchmarks, it is now possible to update the ACT Aspire ELA and STEM Benchmarks for grades 3-10 so that they are predictive of meeting the ACT College Readiness Benchmarks. The purpose of this study is to develop ACT Aspire ELA and STEM Benchmarks for grades 8-10 as the scores associated with a 50% chance of meeting the respective ACT College Readiness Benchmark based on available longitudinal data and to set Benchmarks for grades 3-7 that are approximately the same distance from the mean (in standard deviation units) as the grade 8 Benchmarks. The reason for not linking grades 3-7 directly to grade 11 is that longitudinal data to the ACT test is not available yet, and the predictive power is weaker when the grades are further apart.

Methods

Sample for grades 8-11

A longitudinal data set with students who took ACT Aspire in grades 8, 9, or 10 and the ACT test in grade 11 was constructed. For ELA, students must have taken the English, reading, and writing portions of each test. For STEM, students must have taken the mathematics and science portions of each test. For ELA, students belonging to the 2017 and 2018 cohorts[3] were included. For STEM, students belonging to the 2017 and 2018 cohorts were included for the 8th grade sample; students belonging to the 2016, 2017, and 2018 cohorts were included for the 9th grade sample; and students belonging to the 2015, 2016, 2017, and 2018 cohorts were included for the 10th grade sample.

The optional ACT writing test was introduced in 2005, and an enhanced version of the test was introduced in fall 2015. The enhancements included redesigned writing prompts, extended testing time, and use of an analytical rubric for four writing domains instead of a holistic six-point rubric. For ELA, our sample is restricted to students who took the enhanced ACT writing test.

The ACT Readiness Benchmarks assume yearly spacing between tests, culminating in an 11th grade ACT test. Grade 10 ACT Aspire tests that occurred approximately one year (10-14 months) before the grade 11 ACT test were retained for analysis. Similarly, grade 8 and grade 9 ACT Aspire tests that occurred approximately two (22-26 months) and three years (34-38 months) before the grade 11 ACT test were retained for analysis. Table 1 provides the sample size for each pattern of data available.

Table 1. Longitudinal Data Available for Analysis.

	Test scores available (X = yes, 0 = no)					
	Grade 8	**Grade 9**	**Grade 10**	**Grade 11 (ACT test)**	**N ELA**	**N STEM**
Missing data pattern	X	X	X	X	142	579
	X	X	0	X	69	226
	X	0	X	X	6,595	7,819
	X	0	0	X	2,023	4,843
	0	X	X	X	14,184	23,830
	0	X	0	X	13,270	23,438
	0	0	X	X	120,440	187,271
ELA Total	8,829	27,665	141,361	156,723	156,723	
STEM Total	13,467	48,073	219,499	248,006		248,006

Note: Counts for grade 8, grade 9, and grade 10 sum to more than the total N because some students are included in multiple grade levels.

For ELA, the data set contains 156,723 students who took the ACT ELA tests in 11th grade and took the ACT Aspire ELA tests in grades 8, 9, and/or 10. Only 142 students took the ELA tests all four years. The grade 10 sample (N=141,361) is very large, followed by the grade 9 sample (N=27,665) and the grade 8 sample (N=8,829). Sample sizes vary by grade level because there are different sets of states and districts using ACT Aspire at different grade levels. For ELA, Table 2 documents demographics and academic achievement averages for the three grade-level samples and total sample.

For STEM, the data set contains 248,006 students who took the ACT STEM tests in 11th grade and took the ACT Aspire STEM tests in grades 8, 9, and/or 10. Only 579 students took the STEM tests all four years. The grade 10 sample (N=219,499) is very large, followed by the grade 9 sample (N=48,073) and the grade 8 sample (N=13,467). Table 3 documents demographics and academic achievement averages for the STEM samples.

Using the same student weighting procedure as used for the ACT College Readiness Benchmarks (Allen, 2013), the total sample was weighted to match the population of ACT-tested students. Students in the ACT graduating class of 2017 from states where the majority of students took the ACT test were used as the population. Weights were determined by the cell combination of ACT Composite score range, race/ethnicity, and high school GPA range. Tables 2 and 3 include a comparison of the total sample before and after weighting, showing that the weighting resulted in a slight increase in mean academic achievement and greater representation of African American and Hispanic students.

Ideally, the Benchmarks would be estimated using a common sample (e.g., students who took the ELA or STEM tests all four years), or at least the samples would be very similar across grade levels. From Tables 2 and 3, we see that the grade 8 and grade 9 samples are quite different on mean ACT Composite score (21.5 for grade 9 vs. 19.4 for grade 8 for ELA), and that the two samples are concentrated in two different geographic regions (Midwest for grade 9, South for grade 8). Moreover, the mean ACT ELA score for grade 9 (428.2) is greater than the mean for grade 10 (427.8). Similarly, the mean ACT STEM

Table 2. Descriptive Statistics for ELA Samples.

Measure	Grade 8	Grade 9	Grade 10	Total	Weighted Total	Population
ACT Aspire ELA score (mean)	425.4	428.2	427.8			
ACT ELA score (mean)	17.9	20.1	18.7	18.8	19.3	19.1
ACT Composite score (mean)	19.4	21.5	20.2	20.3	20.7	20.2
ACT ELA Benchmark (% met)	37.5	54.0	43.2	44.1	46.9	45.2
HSGPA (mean)	3.15	3.27	3.16	3.17	3.19	3.19
Gender (%)						
Female	50.1	51.9	50.5	50.5	51.9	50.3
Male	49.1	47.2	48.0	47.9	47.0	47.1
Missing	0.9	1.0	1.5	1.6	1.1	2.6
Race/ethnicity (%)						
African American/Black	21.9	6.4	12.4	12.0	14.3	14.5
Asian	1.3	3.5	3.3	3.3	3.3	3.1
Caucasian	55.7	66.2	61.4	61.6	57.7	54.6
Hispanic	5.6	13.0	10.9	11.0	13.7	14.3
Other	5.0	3.8	5.0	4.9	5.8	5.7
Missing	10.5	7.1	7.1	7.2	5.3	7.8
Region (%)						
Midwest	11.3	78.5	50.9	53.0	51.4	35.2
Northeast	0.0	2.3	1.4	1.5	1.7	0.0
South	88.0	12.6	36.1	34.6	35.8	49.1
West	0.6	6.1	11.1	10.4	10.7	15.7

Table 3. Descriptive Statistics for STEM Samples.

Measure	Grade 8	Grade 9	Grade 10	Total	Weighted Total	Population
ACT Aspire STEM score (mean)	423.6	428.3	427.9			
ACT STEM score (mean)	19.3	21.7	20.4	20.5	20.8	20.4
ACT Composite score (mean)	19.3	21.6	20.3	20.4	20.7	20.2
ACT STEM Benchmark (% met)	11.1	23.0	16.3	16.8	18.1	16.2
HSGPA (mean)	3.14	3.32	3.20	3.21	3.19	3.19
Gender (%)						
Female	50.4	50.8	50.0	49.9	51.1	50.3
Male	47.8	47.5	47.5	47.6	47.3	47.1
Missing	1.9	1.7	2.5	2.5	1.7	2.6
Race/ethnicity (%)						
African American/Black	24.2	6.6	11.3	11.2	14.3	14.5
Asian	1.3	3.1	3.5	3.4	3.3	3.1
Caucasian	54.6	67.4	61.4	61.7	57.7	54.6
Hispanic	6.1	10.9	10.4	10.4	13.7	14.3
Other	4.6	3.8	5.3	5.2	5.8	5.7
Missing	9.2	8.2	8.0	8.1	5.2	7.8
Region (%)						
Midwest	10.7	70.9	46.4	47.8	46.5	35.2
Northeast	0.0	1.9	1.6	1.6	1.8	0.0
South	88.7	21.7	41.2	40.5	41.4	49.1
West	0.4	5.0	10.4	9.7	10.0	15.7

score for grade 9 (428.3) is greater than the mean for grade 10 (427.9). Among students who tested in consecutive years, the mean ELA gain score from grade 8 to 9 is 1.0, and the mean ELA gain score from grade 9 to 10 is 1.6. Similarly, the mean STEM gain score from grade 8 to 9 is 1.4, and the mean STEM gain score from grade 9 to 10 is 1.7. Given the mean gain scores, we'd expect mean scores to increase with grade level if the samples were very similar across grade levels. If not accounted for, these differences could lead to artificial differences across grade levels in the ELA and STEM Readiness Benchmarks.

Imputation for grades 8-11

Imputation was used to address the differences across grade levels. For both ELA and STEM, scores for grades 8-10 were imputed for the total sample using the available scores for grades 8-10, grade 11 ACT ELA or STEM score, grade 11 ACT Composite score, and high school GPA. The SAS MI procedure (SAS, 2008) was used to generate 100 imputed data sets. Analysis results can vary across imputed data sets because of random variations in the generated data, and so it's important to use multiple imputed data sets.

The imputation results in the total samples having complete data across all four years. Table 4 compares the sample sizes, correlations, means, and standard deviations before and after imputation. The post-imputation results are based on averages across the 100 imputed data sets. The imputation process maintains the patterns of correlations observed before imputation. After imputation, the pattern of mean ELA scores across grade levels (425.4, 426.5, 428.0) suggests mean gain scores of 1.1 (grade 8-9) and 1.5 (grade 9-10), more consistent with the gain scores observed for students who tested in consecutive years. Similarly, after imputation, the pattern of mean STEM scores across grade levels (424.8, 426.4, 428.0) suggests mean gain scores of 1.6 (grade 8-9) and 1.6 (grade 9-10), again consistent with the gain scores observed for students who tested in consecutive years.

Table 4. Correlations and Descriptive Statistics Before and After Imputation.

		Grade 8	Grade 9	Grade 10	Grade 11
ELA	**Before imputation**				
	Correlations				
	Grade 8	1.000			
	Grade 9	0.853	1.000		
	Grade 10	0.820	0.865	1.000	
	Grade 11	0.796	0.827	0.843	1.000
	N	8,829	27,665	141,361	156,723
	Mean	425.4	428.2	427.8	18.8
	SD	6.2	6.6	7.1	5.7
	After imputation				
		Grade 8	**Grade 9**	**Grade 10**	**Grade 11**
	Correlations				
	Grade 8	1.000			
	Grade 9	0.836	1.000		
	Grade 10	0.810	0.862	1.000	
	Grade 11	0.784	0.832	0.844	1.000
	N	156,723	156,723	156,723	156,723
	Mean	425.4	426.5	428.0	18.8
	SD	6.0	6.8	7.1	5.7
STEM	**Before imputation**				
		Grade 8	**Grade 9**	**Grade 10**	**Grade 11**
	Correlations				
	Grade 8	1.000			
	Grade 9	0.855	1.000		
	Grade 10	0.837	0.871	1.000	
	Grade 11	0.806	0.838	0.852	1.000
	N	13,467	48,073	219,499	248,006
	Mean	423.6	428.3	427.9	20.5
	SD	7.0	7.6	8.3	4.9
	After imputation				
		Grade 8	**Grade 9**	**Grade 10**	**Grade 11**
	Correlations				
	Grade 8	1.000			
	Grade 9	0.848	1.000		
	Grade 10	0.837	0.865	1.000	
	Grade 11	0.810	0.836	0.853	1.000
	N	248,006	248,006	248,006	248,006
	Mean	424.8	426.4	428.0	20.5
	SD	7.1	7.6	8.4	4.9

Logistic regression analysis for grades 8-11

For each grade level, logistic regression was used to find the ACT Aspire ELA and STEM scores associated with a 50% chance of meeting the respective Benchmark on the grade 11 ACT test. To examine the impact of imputation and weighting, three models were fit:

1. Using the original samples before imputation
2. Using the total sample after imputation, without weighting
3. Using the total sample after imputation, with weighting

Models 2 and 3 were fit for each of the 100 imputed data sets. The SAS PROC MIANALYZE procedure (SAS, 2008) is used to combine logistic regression results across the multiple imputed data sets, and the standard errors of the model estimates include the imputation-induced variability. The ELA and STEM Benchmarks for grades 8-10 were obtained from model 3.

Setting Benchmarks for grades 3-7

After the Benchmarks were set for grades 8-10, the Benchmarks for grades 3-7 were set using statistical moderation (Mislevy, 1992) with linking to the grade 8 Benchmarks. Using this approach, the Benchmarks for grades 3-7 are the scores that are the same distance from the mean, in standard deviation units, as the grade 8 Benchmark. The means and standard deviations are obtained from a special scaling study conducted in 2013. This approach was also used to set grade 3-7 Benchmarks for English, mathematics, reading, and science and is described in Chapter 13 of the ACT Aspire Summative Technical Manual (ACT, 2017).

Results

Logistic regression results for grades 8-10

For ELA, Table 5 summarizes the logistic regression results, providing estimates of the intercept, slope, and 50% cut score for each model. The intercepts and slopes describe the relationship between ELA scores for grades 8, 9, and 10 and the probability of meeting the ACT ELA Benchmark in grade 11. Figure 1 shows the estimated probability curves corresponding to model 3. As expected, the probability of meeting the ACT ELA Benchmark increases sharply as ELA scores increase.

The Benchmarks for grades 8-10 are the scores associated with a 50% chance of meeting the ACT ELA Benchmark, rounded to the nearest whole number. As illustrated in Figure 1 by the black arrow, the 10th grade ELA score associated with the 0.50 probability is near 430.

Model 1, which did not use imputation or weighting, suggests that ELA scores of 428 (grade 8), 428 (grade 9), and 430 (grade 10) are associated with a 50% chance of meeting the

Table 5. Logistic Regression Results for ELA.

Model	Parameter Estimate	Grade 8	Grade 9	Grade 10
1 No imputation, no weighting	Intercept (SE)	-176.50 (3.81)	-172.30 (2.03)	-183.20 (0.969)
	Slope (SE)	0.4124 (0.0089)	0.4029 (0.0048)	0.4264 (0.0023)
	50% cut score	428.0	427.6	429.6
2 Imputation, no weighting	Intercept (SE)	-165.16 (1.676)	-173.58 (1.300)	-181.62 (0.947)
	Slope (SE)	0.3871 (0.0039)	0.4058 (0.0030)	0.4227 (0.0022)
	50% cut score	426.6	427.8	429.7
3 Imputation and weighting	Intercept (SE)	-163.01 (1.714)	-171.78 (1.358)	-180.16 (1.036)
	Slope (SE)	0.3822 (0.0040)	0.4016 (0.0032)	0.4194 (0.0024)
	50% cut score	426.5	427.7	429.6

Note: SE = standard error

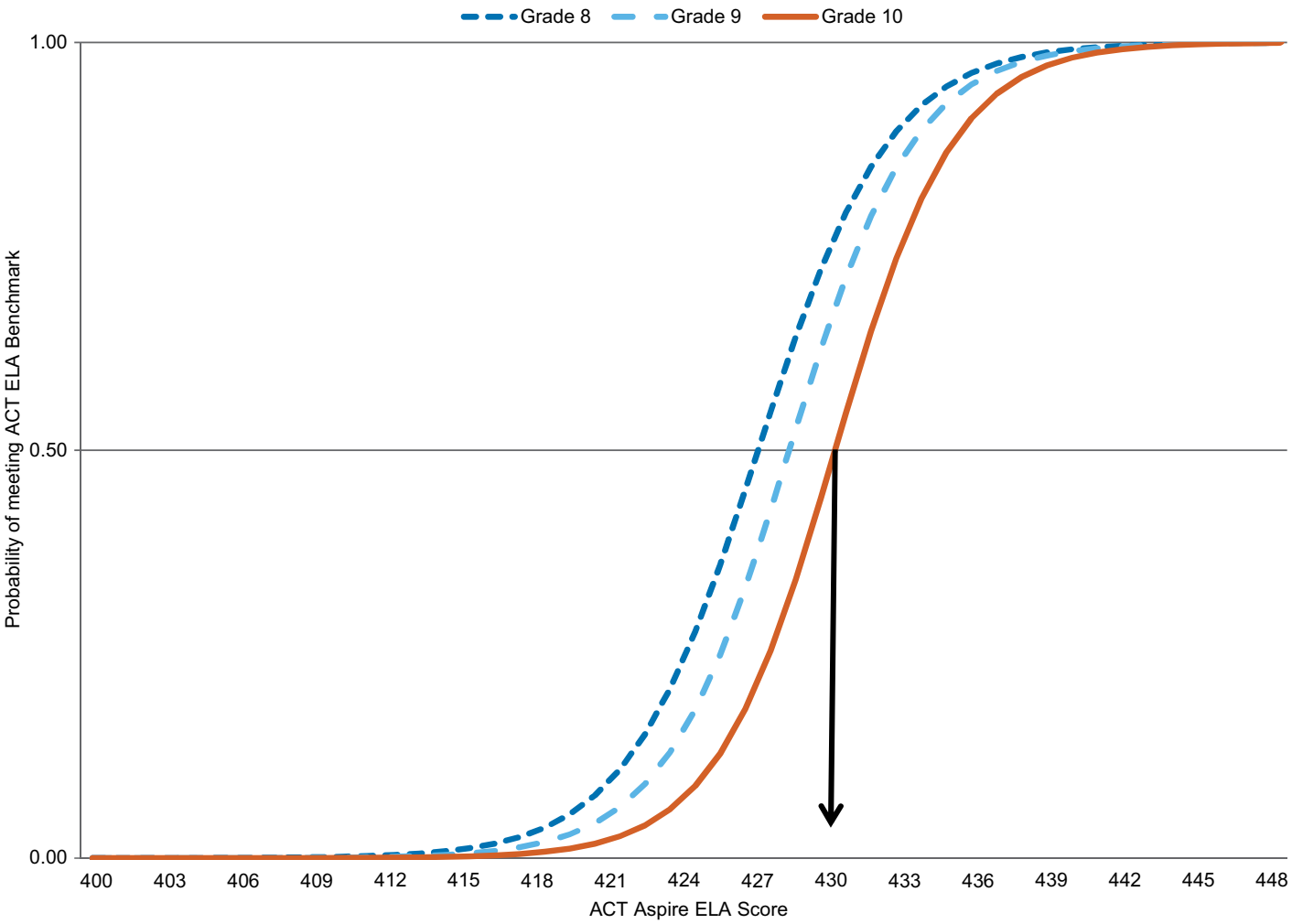

Figure 1. Probability of meeting ACT ELA Benchmark by ACT Aspire ELA score.

ACT ELA Benchmark. Model 2, which used imputation but not weighting, suggests ELA Readiness Benchmarks of 427 (grade 8), 428 (grade 9), and 430 (grade 10). These are more consistent with the gain score patterns discussed earlier. Model 3, which used imputation and weighting, suggests the same ELA Readiness Benchmarks as Model 2.

For STEM, Table 6 summarizes the logistic regression results, and Figure 2 shows the estimated probability curves corresponding to model 3. Again, as expected, the probability of meeting the ACT STEM Benchmark increases sharply as STEM scores increase.

Model 1, which did not use imputation or weighting, suggests that STEM scores of 434 (grade 8), 435 (grade 9), and 438 (grade 10) are associated with a 50% chance of meeting the ACT STEM Benchmark. Model 2, which used imputation but not weighting, suggests STEM Readiness Benchmarks of 433 (grade 8), 435 (grade 9), and 438 (grade 10). Model 3, which used imputation and weighting, suggests STEM Readiness Benchmarks of 433 (grade 8), 435 (grade 9), and 437 (grade 10).

Table 6. Logistic Regression Results for STEM.

Model	Parameter Estimate	Grade 8	Grade 9	Grade 10
1 No imputation, no weighting	Intercept (SE)	-174.40 (4.05)	-178.30 (1.82)	-194.10 (1.05)
	Slope (SE)	0.4016 (0.0094)	0.4097 (0.0042)	0.4436 (0.0024)
	50% cut score	434.3	435.2	437.6
2 Imputation, no weighting	Intercept (SE)	-162.32 (1.56)	-171.22 (1.20)	-188.08 (1.01)
	Slope (SE)	0.3747 (0.0036)	0.3935 (0.0028)	0.4298 (0.0023)
	50% cut score	433.2	435.1	437.6
3 Imputation and weighting	Intercept (SE)	-164.64 (1.64)	-173.30 (1.29)	-190.30 (1.10)
	Slope (SE)	0.3802 (0.0038)	0.3984 (0.0030)	0.4350 (0.0025)
	50% cut score	433.0	435.0	437.4

Note: SE = standard error

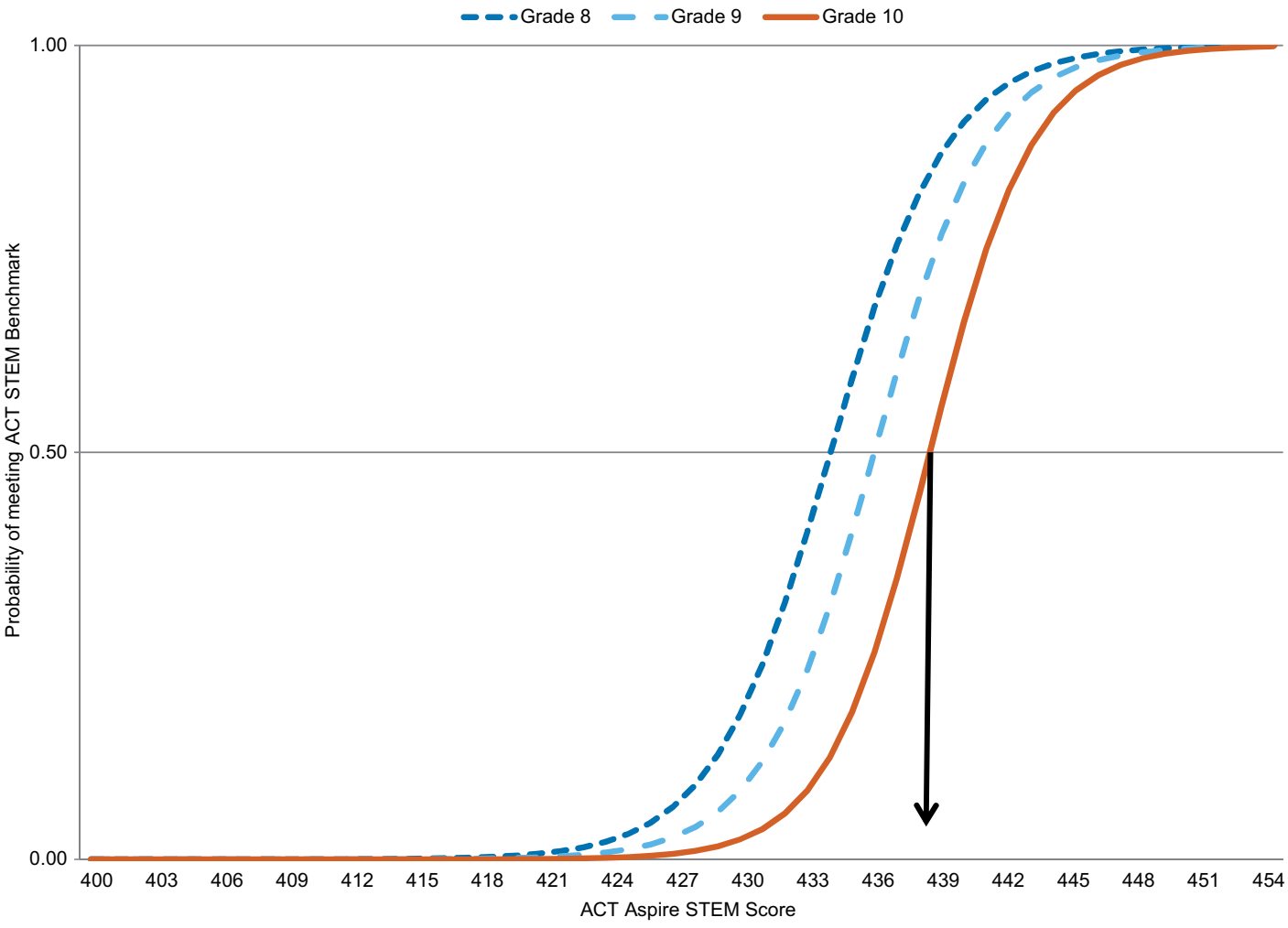

Figure 2. Probability of meeting ACT STEM Benchmark by ACT Aspire STEM score.

ELA and STEM Benchmarks for grades 3-10

Model 3 of Table 5 results in ELA Readiness Benchmarks of 427, 428, and 430 for grade 8, 9, and 10, respectively. The initial ELA Readiness Benchmarks were 425, 426, and 428, respectively, so the Benchmarks have increased by 2 for each grade level. For the total sample after imputation, we provide the percentage of students meeting the initial and updated ELA Benchmarks (Table 7). The percent meeting the updated Benchmarks is consistent across grades 8-11, ranging from 46.8% to 47.9%. Relative to the initial Benchmarks, there is greater consistency across grade levels in percentage of students meeting the Benchmarks.

Model 3 of Table 6 results in STEM Readiness Benchmarks of 433, 435, and 437 for grade 8, 9, and 10, respectively. The initial STEM Readiness Benchmarks were 426, 429, and 432, respectively, so the Benchmarks have increased by 5-7 points for each grade level. Because the STEM Benchmarks are now linked to a higher performance criterion (the ACT STEM score of 26, rather than the average of the ACT Mathematics and Science Benchmarks), it is not surprising that the Readiness Benchmarks for STEM increased substantially. For the total sample after imputation, the percentage of students meeting the initial and updated STEM Benchmarks are provided in Table 7. The percent meeting the updated Benchmarks is consistent across grades 8-11, ranging from 16.0% to 19.3%.

Using the grade 8 Benchmark values before rounding (426.525 for ELA and 433.011 for STEM), the ELA and STEM Benchmarks for grades 3-7 are set using statistical moderation, resulting in the values provided in Table 8. The Benchmarks for grades 3-7 are obtained by multiplying the grade-specific scale score standard deviation with the grade 8 Benchmark z-score[4] and then adding the grade-specific scale score mean. Results are then rounded to the nearest whole number (.5 rounds up). In three cases,[5] the Benchmarks were adjusted down by one point to obtain greater consistency across grade levels in the percentage of students meeting Benchmarks and greater conformity with mean gain scores.

Table 7. Comparing Initial and Updated ELA and STEM Readiness Benchmarks.

	Grade level	Initial Benchmark	% Meeting
ELA	8	425	59.4
	9	426	58.7
	10	428	58.3
	11 (ACT)	20	46.9
	Grade level	**Updated Benchmark**	**% Meeting**
	8	427	46.8
	9	428	47.8
	10	430	47.9
	11 (ACT)	20	46.9
	Grade level	**Initial Benchmark**	**% Meeting**
STEM	8	426	46.7
	9	429	40.2
	10	432	37.5
	11 (ACT)	26	18.1
	Grade level	**Updated Benchmark**	**% Meeting**
	8	433	16.0
	9	435	16.7
	10	437	19.3
	11 (ACT)	26	18.1

Table 8. Updated ELA and STEM Readiness Benchmarks.

Grade level	ELA	STEM
3	419	420
4	422	422
5	424	425
6	426	428
7	426	430
8	427	433
9	428	435
10	430	437
11 (ACT)	20	26

Unlike the scores for the other subject areas, ACT Aspire ELA scores are not reported on a vertical scale. While two of the components of the ELA score (English and reading scores) are reported on a vertical scale, the writing score component is not. The ELA Benchmark still increases with grade level, with the exception of grade 6 to grade 7, where it is 426 for both grade levels. On average, students' writing scores decrease by about 1.6 score points from grade 6 to grade 7. This contributes to a small average gain in ELA score of about 0.6 points from grade 6 to 7, and so having the same integer value of the ELA Benchmark from grade 6 to grade 7 is generally consistent with the small average gain.

Figures 3 and 4 show the percentage of students meeting ELA and STEM Benchmarks, by grade level, based on spring 2017 ACT Aspire data. The percentages for the updated ELA Benchmarks are equal to or lower than those for the original Benchmarks, with differences ranging from 0% to 17%. The percentages for the updated STEM Benchmarks are much lower than those for the original Benchmarks, with differences ranging from 15% to 33%. As discussed earlier, this is due to the greater difficulty of meeting the ACT STEM Benchmark. For both scores, the percentages appear to be more consistent across grade levels with the updated Benchmarks; however, it should be noted that there are different schools and districts represented across grade levels in the spring 2017 ACT Aspire data.

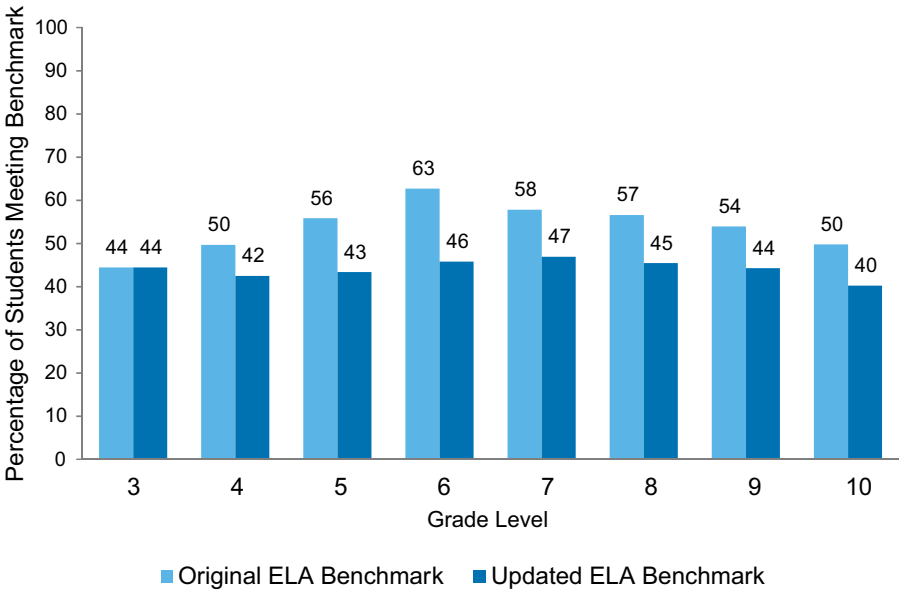

Figure 3. Percentage of students meeting the ELA Benchmark based on spring 2017 ACT Aspire data.

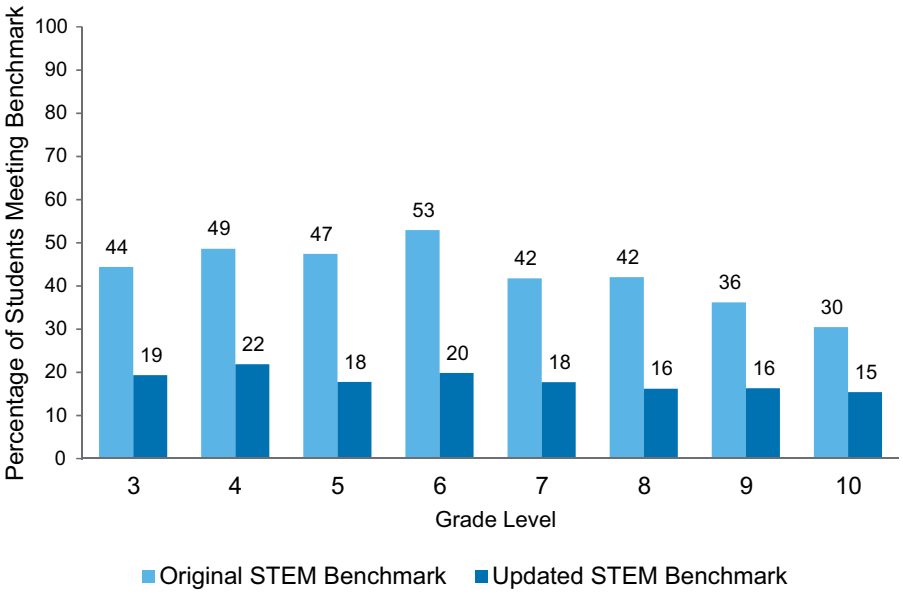

Figure 4. Percentage of students meeting the STEM Benchmark based on spring 2017 ACT Aspire data.

Summary

ACT Readiness Benchmarks for grades 3-10 indicate whether students are on target to meet the ACT College Readiness Benchmark in grade 11 in the respective subject area. In this study, ELA and STEM Readiness Benchmarks for grades 3-10 were updated. Students meeting the ELA Benchmarks are on target to meet the ACT ELA Benchmark score of 20, indicating that they have at least a 50% chance of earning a B or higher grade (and approximately a 75% chance of earning a C or higher grade) in ELA-related courses and social science courses at the typical college. Students meeting the STEM Benchmarks are on target to meet the ACT STEM Benchmark score of 26, indicating that they are prepared for success in STEM-related courses of Calculus, Biology, Chemistry, Physics, and Engineering at the typical college.

Notes

1. ACT Readiness Benchmarks were also reported for writing. The Benchmarks for writing were set to a score of 428, which corresponded to ratings consistent with grade level expectations on the base ACT Aspire writing test form. Beginning fall 2017, scale scores for writing will no longer be reported, and Readiness Benchmarks for writing will no longer be referenced.
2. In 2015, STEM Benchmarks for grades 3-10 were explored using statistical moderation, ensuring that the Benchmarks were similar to the ACT STEM Benchmark with respect to distance from the mean (Yi, He, Tao, & Fang, 2016). However, only the initial STEM Benchmarks have been used for ACT Aspire reporting.
3. Expected year of high school completion.
4. Grade 8 Benchmark z-score = (grade 8 Benchmark – grade 8 mean) / grade 8 standard deviation.
5. ELA grade 3, ELA grade 7, and STEM grade 5.

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