The Accuracy of Students' Novice, Apprentice, Proficient, and Distinguished Classifications for the 2022 Kentucky Summative Assessment (KSA) Tests

Final Report

Prepared for:	Kentucky Department of Education Office of Assessment and Accountability 300 Sower Boulevard Frankfort, KY 40601	**Prepared under:**	Contract #1900004339
Authors:	Brittany F. Crawford Emily R. Dickinson	**Date:**	October 31, 2022

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Background

The Kentucky Department of Education (KDE) has contracted with Human Resources Research Organization (HumRRO) to provide third party quality assurance and validity studies to assist KDE in meeting its statutory responsibilities under KRS 158.6453 and KRS 158.6455. Among the studies carried out on an annual basis, HumRRO independently calculates the accuracy of student classifications derived from assessments administered under the state accountability system. Classification accuracy is a method for considering the reliability of a test. This report presents those analyses for the 2022 Kentucky Summative Assessment (KSA) tests.

In spring 2022, Kentucky administered KSA for the second time. Students in grades 3 through 8 and grade 10 were tested in reading and mathematics. Science was assessed in grades 4, 7, and 11. Additionally, social studies, editing and mechanics, and on-demand writing were assessed in grades 5 and 8, and 11[1].

For scoring and reporting, each grade/subject/form combination is treated as a separate test. Based on the results of these tests, each student is classified into one of four proficiency levels: Novice, Apprentice, Proficient, or Distinguished (NAPD). The percentage of students at each of these levels contributes to schools' and districts' overall accountability ratings.

Grade/subject/form combinations included in the classification accuracy calculations are presented in Table 1. Scoring is a two-step process described in a prior summative assessment technical manual (KDE, 2019). Students first receive a scale score derived from their responses to the items on the test. "Cut points" have been set to allow for the categorization of student scores into NAPD performance levels. Performance level descriptors and associated cut scores indicate mastery levels that are needed to be considered "on track" for college and career readiness.

Table 1. Grade/Subject/Form Combinations for the KSA Test Analyzed for Classification Accuracy

Subject	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
Reading (G3: 6 forms; G4-HS: 4 forms/grade)	X	X	X	X	X	X	X
Mathematics 6 forms/grade	X	X	X	X	X	X	X
Science 4 forms/grade		X			X		X
Social Studies 5 forms/grade			X			X	X
Editing and Mechanics 3 forms/grade			X			X	X

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[1] We do not evaluate students' classifications for the 2022 KSA on-demand writing assessments as part of this research.

Methods and Results

Reliability of an observed test score is the product of two factors: true proficiency in the knowledge area being assessed and measurement error that comes from a variety of sources. Obtained scores are known, but true scores are unknown. Using test reliability-related statistics, however, it is possible to provide estimations that answer the following two questions:

- For a given obtained score, what are the odds that true proficiency is in the same NAPD classification?

- For that given obtained score, what are the odds that true proficiency falls into a different NAPD classification?

Classical test theory is based on the concept of a "true" score for each examinee, defined as the expected or average score across an infinite number of repeated tests (see, for example, Lord and Novick, 1968). In most cases, we only have a score from a single administration of the test in question. The difference between this single "observed" score and the underlying "true" score is error. In the present case, we are concerned not just with the size of this "error," but with the impact of error on classifying students into NAPD categories. Our concern is estimating the rate of classification error, defined as the probability that students could be classified in an NAPD category, based on a single test administration, other than the one in which their "true" score falls. Classification accuracy is usually used to connote the likelihood that classification from observed scores agrees with classification expected by true scores. The converse, which we will call misclassification, is the likelihood that a student's true score is in a proficiency classification different from his/her observed score. The phrasing of this last sentence is important because it expresses error in a meaningful way for individual students and their parents. Parents know their students' test score; information should be provided which helps them with the uncertainty about their students' true proficiency based on that score.

Test theory is concerned with the uncertainty of estimating students' true achievement levels based on their fallible, observed test scores. Observed scores are assumed to vary in lawful ways around theoretical true scores or around domain scores (theoretical scores derived from all possible forms and conditions for measuring performance). This variation of observed scores around true or domain scores is calculated as the standard error of measurement (σ_e). In traditional reliability and generalizability theory, σ_e is a simple function of reliability (r_{tt}) and total test variability (σ_T):

$$\sigma_e = \sigma_T \ (1 - r_{tt})$$

Error bands around estimated scores often accompany reports of students' test scores. These error bands are based on σ_e with the assumption that errors of measurement are normally distributed. Although σ_e reflects the variation of observed scores around true scores, because σ_e is constant across the scale of measurement, σ_e is also used to estimate the likelihood of true scores being within predictable intervals around observed scores. For students with a given observed score, the distribution of their true scores can be estimated by σ_e. For example, error bands may be constructed to show the interval around observed scores, which with 95 percent confidence, should contain students' true scores.

If score intervals are divided into proficiency levels, such as NAPD, then σ_e may also be used to estimate misclassification. That is, for any given estimated score, the probably that a student's true score lies in the score interval of an adjacent proficiency classification can be estimated from σ_e and normal distribution cumulative probabilities. An obvious implication of this is that the

closer a student's observed score is to a cut point between two proficiency levels, the greater the chances that the student is misclassified. Indeed, the likelihood of misclassification approaches 50 percent for scores very near a cut point, regardless of σ_e.

Full data cleaning and analysis details are presented in Appendix B. In the next section, we provide an example to guide the interpretation of classification accuracy results.

Reading the Classification Accuracy Tables Using Spring 2022 KSA Grade 3 Reading Form 1 as an Example

In Table 2 and similar tables in Appendix A, numbers represent percentages of all students, so that the sum of all the percentages of students by category is 100 (within rounding). The "Total % Assigned" row near the bottom of the table indicates the percent of students who were assigned each of the four NAPD classifications. For example, in Table 2, 34.01% of all Grade 3 students who took the first form of the KSA in reading received test scores that placed them in the Novice category. Likewise, 26.41% of all students received test scores within the score range for the Apprentice category; 23.71% were Proficient; and 15.87% were Distinguished.

Table 2. Grade 3 Form 1 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	***28.00***	*5.48*	0.13	< 0.01	33.61
Apprentice	*5.91*	***16.82***	4.99	0.04	27.77
Proficient	0.10	4.08	***15.77***	*3.63*	23.57
Distinguished	< 0.01	0.03	*2.82*	***12.20***	15.05
Total % Assigned	34.01	26.41	23.71	15.87	100

Note. Total % Correct Assignments= 72.78. Average Distribution Error= 0.68. Total % Proficient/Not Proficient Correct Assignments= 90.63.

Since test scores are not perfect, some proportion of students are expected to have true achievement in categories matching their assigned categories, with the remaining students expected to have true achievement that falls in categories other than their assigned categories. The bold italicized numbers in Table 2 indicate proportions of accurate classifications. That is, 28.00% of all students are expected to be accurately classified as Novice, 16.82% of all students are expected to be accurately classified as Apprentice, 15.77% of all students are expected to be accurately classified as Proficient, and 12.20% of all students are expected to be accurately classified as Distinguished. The sum of these four percentages (72.78), or the "Total % Expected Correct Assignments," is the percent of all students expected to be classified accurately. That is, approximately 73% of all Grade 3 students would be assigned to the same category of reading proficiency if we actually knew their true achievement.

Student classification accuracy data has important implications for school accountability scores. School accountability scores are a function of all students' classifications. Some of the inevitable classification error will be in one direction and some in the other. As seen in Table 2, some proportion of students are expected be classified higher than their true proficiency and some lower. The percentage of students actually assigned to a particular category versus our projections of the percent of students expected to have true achievement at that level shows that the misclassification errors tend to balance out for the total student population. For example, the last column in Table 2 shows that 27.77% of the students are expected to be Apprentice based on

their unknowable true scores, while 26.41% of the students are assigned the Apprentice classification based on their test performance. The difference between these percentages is 1.36. Differences between the expected and assignment distributions for the other three categories are similarly close, with the average difference in category percentages being 0.68.

Accountability systems often report the percentage of students achieving proficiency and above. Thus, the accuracy of Proficient/Not Proficient classifications is of particular interest. By summing all the italicized values in Table 2, we find that the accuracy of Proficient/Not Proficient classifications is 90.63%. Similar results tables for all included 2022 KSA grade/subjects are presented in Appendix A.

Summary of the Results

Table 3 shows the total expected correct assignments for all KSA grade/subject/form combinations for 2022, with the results from the analysis of 2012, 2019, and the 2021 KSA added for illustrative purposes. In 2022, student classification accuracy varies from approximately 61.28% (Grade 10 mathematics) to approximately 78.11% (Grade 3 mathematics). Overall, editing and mechanics has the lowest accuracy (63.16% to 70.03%). Nearly all the accuracy rates for 2022 KSA are lower than 2012 and 2019 summative assessment administrations, as would be expected given that the test has been reduced in length over the years. Additionally, we found the results between the 2021 and 2022 KSA administrations to be comparable with a noticeable increase in the percent of expected correct classifications across most grades for reading and the elementary grades for mathematics.

Turning from the individual level accuracy data to the distribution accuracy results, the four right-most columns in Table 3 summarize how well the distribution of assigned classifications matches the expected distribution of true classifications by showing the difference between expected and assigned total percentages averaged across the four achievement levels. As would be expected, this average error is larger among the subject areas with lower accuracy.

Table 3. Total Percent Expected Correct Classifications and Average Category Distribution Error with Comparison Data from 2012, 2019, and 2021

Subject/Grade	% Correct 2012	% Correct 2019	% Correct 2021	% Correct 2022	Dist. Error 2012	Dist. Error 2019	Dist. Error 2021	Dist. Error 2022
MA 03	78.9	81.2	74.91	78.11	2.1	0.6	1.43	0.60
MA 04	78.3	80.8	72.05	76.61	1.7	0.5	1.27	0.78
MA 05	79.9	81.9	74.92	76.93	1.1	0.4	0.66	0.56
MA 06	80.1	82.4	73.60	71.44	1.5	0.8	1.26	1.52
MA 07	80.2	81.4	74.53	68.51	2.5	0.7	1.08	1.99
MA 08	80.6	81.7	73.14	70.27	1.4	0.5	0.80	2.00
MA 10	NA	NA	69.40	61.28	NA	NA	2.72	3.80
RD 03	73.4	75.5	74.71	74.05	0.4	0.9	1.14	0.76
RD 04	74.3	75.2	68.55	73.07	1.5	1.2	2.26	1.00
RD 05	74.8	75.4	68.69	74.99	1.0	1.2	2.93	0.86
RD 06	76.9	78.3	70.56	72.73	1.4	0.6	1.31	1.09
RD 07	74.5	76.4	70.22	72.04	1.5	1.1	2.14	1.13
RD 08	75.5	77.8	70.69	71.11	1.4	0.6	1.77	1.36
RD 10	NA	NA	68.45	70.12	NA	NA	2.76	0.98

Table 3. (Continued)

Subject/Grade	% Correct 2012	% Correct 2019	% Correct 2021	% Correct 2022	Dist. Error 2012	Dist. Error 2019	Dist. Error 2021	Dist. Error 2022
SC 04	78.1	77.8	70.93	69.98	2.1	1.7	3.70	3.14
SC 07	78.5	78.7	73.00	71.11	1.4	1.7	1.56	1.27
SC HS	NA	79.5	73.19	72.55	NA	1.2	1.90	1.63
SS 05	NA	NA	NA	70.17	NA	NA	NA	1.31
SS 08	NA	NA	NA	68.93	NA	NA	NA	0.96
SS HS	NA	NA	NA	65.69	NA	NA	NA	1.50
EM 05	NA	NA	NA	67.61	NA	NA	NA	2.23
EM 08	NA	NA	NA	70.03	NA	NA	NA	1.68
EM HS	NA	NA	NA	63.16	NA	NA	NA	2.38

Note. % Correct= percentage expected to be correctly classified. Dist. Error= average category distribution error. Average Distribution Error is the average of the differences between the expected and assigned percentages across the NAPD categories. High school mathematics and reading were not included in the 2012 and 2019 analyses. High school science was not included in the 2012 analysis. Additionally, social studies and editing and mechanics were not included in the 2012, 2019, and 2021 analyses. 2019 and 2021 science values are averages across forms. Finally, 2022 values for each subject are averaged across forms.

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Appendix A. Classification Accuracy Tables for KSA Spring 2022

Table A-1. Grade 3 Form 1 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*38.44*	*5.40*	0.11	< 0.01	43.95
Apprentice	*5.27*	*16.10*	4.81	0.04	26.22
Proficient	0.09	4.02	*15.31*	*3.31*	22.73
Distinguished	< 0.01	0.02	*2.32*	*4.76*	7.11
Total % Assigned	43.79	25.54	22.56	8.11	100

Note. Total % Correct Assignments= 74.60. Average Distribution Error= 0.50. Total % Proficient/Not Proficient Correct Assignments= 90.90.

Table A-2. Grade 3 Form 2 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.54*	*3.83*	0.01	< 0.01	31.38
Apprentice	*4.08*	*20.59*	4.15	< 0.01	28.81
Proficient	0.01	4.13	*23.41*	*3.30*	30.85
Distinguished	< 0.01	< 0.01	*2.18*	*6.77*	8.95
Total % Assigned	31.63	28.55	29.76	10.07	100

Note. Total % Correct Assignments= 78.30. Average Distribution Error= 0.68. Total % Proficient/Not Proficient Correct Assignments= 91.69.

Table A-3. Grade 3 Form 3 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*26.51*	*3.26*	0.01	< 0.01	29.78
Apprentice	*3.74*	*20.44*	3.95	< 0.01	28.13
Proficient	0.01	3.83	*23.16*	*3.31*	30.32
Distinguished	< 0.01	< 0.01	*2.65*	*9.13*	11.78
Total % Assigned	30.26	27.53	29.77	12.44	100

Note. Total % Correct Assignments= 79.24. Average Distribution Error= 0.57. Total % Proficient/Not Proficient Correct Assignments= 92.20.

Table A-4. Grade 3 Form 4 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*29.82*	*3.85*	0.01	< 0.01	33.69
Apprentice	*3.79*	*19.54*	3.84	< 0.01	27.18
Proficient	0.01	3.75	*22.45*	*3.51*	29.73
Distinguished	< 0.01	< 0.01	*2.26*	*7.15*	9.41
Total % Assigned	33.63	27.15	28.56	10.67	100

Note. Total % Correct Assignments= 78.97. Average Distribution Error= 0.63. Total % Proficient/Not Proficient Correct Assignments= 92.38.

Table A-5. Grade 3 Form 5 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.16*	*3.47*	< 0.01	< 0.01	30.64
Apprentice	*3.76*	*24.08*	4.05	< 0.01	31.90
Proficient	< 0.01	3.67	*22.06*	*3.25*	28.99
Distinguished	< 0.01	< 0.01	*2.26*	*6.21*	8.48
Total % Assigned	30.93	31.23	28.38	9.47	100

Note. Total % Correct Assignments= 79.53. Average Distribution Error= 0.64. Total % Proficient/Not Proficient Correct Assignments= 92.27.

Table A-6. Grade 3 Form 6 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*28.50*	*3.60*	< 0.01	< 0.01	32.10
Apprentice	*3.73*	*23.95*	3.83	0.01	31.52
Proficient	< 0.01	3.66	*18.18*	*3.22*	25.07
Distinguished	< 0.01	0.01	*2.52*	*8.78*	11.31
Total % Assigned	32.24	31.21	24.53	12.02	100

Note. Total % Correct Assignments= 79.42. Average Distribution Error= 0.42. Total % Proficient/Not Proficient Correct Assignments= 92.50.

Table A-7. Grade 4 Form 1 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*40.35*	*4.53*	0.05	< 0.01	44.93
Apprentice	*4.64*	*16.44*	4.27	0.01	25.36
Proficient	0.05	3.73	*18.07*	*2.39*	24.25
Distinguished	< 0.01	< 0.01	*1.32*	*4.14*	5.46
Total % Assigned	45.04	24.70	23.72	6.54	100

Note. Total % Correct Assignments= 79.01. Average Distribution Error= 0.59. Total % Proficient/Not Proficient Correct Assignments= 91.89.

Table A-8. Grade 4 Form 2 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*28.04*	*4.57*	0.05	< 0.01	32.66
Apprentice	*4.83*	*17.60*	4.41	< 0.01	26.84
Proficient	0.05	4.01	*22.10*	*3.27*	29.41
Distinguished	< 0.01	< 0.01	*2.30*	*8.79*	11.09
Total % Assigned	32.92	26.17	28.85	12.06	100

Note. Total % Correct Assignments= 76.52. Average Distribution Error= 0.61. Total % Proficient/Not Proficient Correct Assignments= 91.48.

Table A-9. Grade 4 Form 3 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*26.02*	*3.84*	0.04	< 0.01	29.89
Apprentice	*4.42*	*17.80*	4.53	< 0.01	26.76
Proficient	0.04	4.39	*25.27*	*3.47*	33.17
Distinguished	< 0.01	< 0.01	*2.31*	*7.87*	10.18
Total % Assigned	30.48	26.03	32.14	11.35	100

Note. Total % Correct Assignments= 76.96. Average Distribution Error= 0.88. Total % Proficient/Not Proficient Correct Assignments= 91.00.

Table A-10. Grade 4 Form 4 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*26.12*	*3.85*	0.04	< 0.01	30.01
Apprentice	*4.44*	*17.87*	4.52	0.01	26.84
Proficient	0.04	4.40	*21.29*	*3.85*	29.58
Distinguished	< 0.01	0.01	*2.65*	*10.91*	13.57
Total % Assigned	30.60	26.13	28.49	14.78	100

Note. Total % Correct Assignments= 76.19. Average Distribution Error= 0.90. Total % Proficient/Not Proficient Correct Assignments= 90.98.

Table A-11. Grade 4 Form 5 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*31.37*	*4.00*	0.12	< 0.01	35.49
Apprentice	*4.63*	*13.12*	4.48	< 0.01	22.23
Proficient	0.13	4.36	*25.30*	*3.46*	33.25
Distinguished	< 0.01	< 0.01	*2.23*	*6.79*	9.03
Total % Assigned	36.13	21.49	32.13	10.25	100

Note. Total % Correct Assignments= 76.59. Average Distribution Error= 0.93. Total % Proficient/Not Proficient Correct Assignments= 90.91.

Table A-12. Grade 4 Form 6 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.16*	*3.81*	0.05	< 0.01	29.02
Apprentice	*5.05*	*19.81*	5.46	0.02	30.35
Proficient	0.06	5.01	*22.07*	*3.77*	30.90
Distinguished	< 0.01	0.01	*2.41*	*7.31*	9.73
Total % Assigned	30.27	28.64	29.99	11.10	100

Note. Total % Correct Assignments= 74.35. Average Distribution Error= 1.31. Total % Proficient/Not Proficient Correct Assignments= 89.40.

Table A-13. Grade 5 Form 1 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*36.54*	*5.74*	0.08	< 0.01	42.35
Apprentice	*4.98*	*16.22*	4.17	0.01	25.37
Proficient	0.05	3.28	*16.97*	*2.62*	22.92
Distinguished	< 0.01	< 0.01	*1.85*	*7.51*	9.36
Total % Assigned	41.56	25.23	23.07	10.14	100

Note. Total % Correct Assignments= 77.24. Average Distribution Error= 0.47. Total % Proficient/Not Proficient Correct Assignments= 92.42.

Table A-14. Grade 5 Form 2 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.69*	*4.62*	0.02	< 0.01	30.33
Apprentice	*4.88*	*21.29*	4.42	< 0.01	30.59
Proficient	0.02	3.76	*22.86*	*2.95*	29.59
Distinguished	< 0.01	< 0.01	*2.18*	*7.31*	9.49
Total % Assigned	30.58	29.67	29.49	10.26	100

Note. Total % Correct Assignments= 77.14. Average Distribution Error= 0.51. Total % Proficient/Not Proficient Correct Assignments= 91.77.

Table A-15. Grade 5 Form 3 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.01*	*5.13*	0.02	< 0.01	29.17
Apprentice	*5.10*	*21.55*	4.31	< 0.01	30.96
Proficient	0.02	3.78	*22.75*	*2.95*	29.50
Distinguished	< 0.01	< 0.01	*2.19*	*8.18*	10.37
Total % Assigned	29.14	30.46	29.27	11.13	100

Note. Total % Correct Assignments= 76.49. Average Distribution Error= 0.38. Total % Proficient/Not Proficient Correct Assignments= 91.87.

Table A-16. Grade 5 Form 4 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.28*	*4.79*	0.02	< 0.01	30.09
Apprentice	*4.75*	*20.58*	4.12	< 0.01	29.46
Proficient	0.02	3.81	*23.02*	*2.98*	29.84
Distinguished	< 0.01	< 0.01	*2.23*	*8.38*	10.61
Total % Assigned	30.05	29.19	29.40	11.37	100

Note. Total % Correct Assignments= 77.26. Average Distribution Error= 0.38. Total % Proficient/Not Proficient Correct Assignments= 92.02.

Table A-17. Grade 5 Form 5 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*22.74*	*3.85*	0.02	< 0.01	26.60
Apprentice	*4.92*	*22.35*	4.61	< 0.01	31.88
Proficient	0.02	4.35	*25.60*	*3.18*	33.15
Distinguished	< 0.01	< 0.01	*2.16*	*6.19*	8.36
Total % Assigned	27.68	30.55	32.39	9.38	100

Note. Total % Correct Assignments= 76.88. Average Distribution Error= 1.05. Total % Proficient/Not Proficient Correct Assignments= 91.00.

Table A-18. Grade 5 Form 6 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*26.25*	*5.17*	0.03	< 0.01	31.45
Apprentice	*5.52*	*22.76*	4.41	< 0.01	32.70
Proficient	0.02	3.61	*21.28*	*2.78*	27.68
Distinguished	< 0.01	< 0.01	*1.94*	*6.23*	8.17
Total % Assigned	31.79	31.55	27.66	9.01	100

Note. Total % Correct Assignments= 76.52. Average Distribution Error= 0.59. Total % Proficient/Not Proficient Correct Assignments= 91.93.

Table A-19. Grade 6 Form 1 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*36.00*	*6.86*	0.40	< 0.01	43.25
Apprentice	*6.22*	*12.89*	5.31	0.01	24.43
Proficient	0.21	3.45	*17.60*	*2.30*	23.56
Distinguished	< 0.01	< 0.01	*1.68*	*7.08*	8.76
Total % Assigned	42.43	23.20	24.99	9.39	100

Note. Total % Correct Assignments= 73.57. Average Distribution Error= 1.03. Total % Proficient/Not Proficient Correct Assignments= 90.63.

Table A-20. Grade 6 Form 2 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.96*	*5.89*	0.33	< 0.01	30.18
Apprentice	*7.21*	*16.14*	6.47	0.02	29.84
Proficient	0.25	4.64	*21.87*	*3.38*	30.14
Distinguished	< 0.01	0.01	*1.87*	*7.97*	9.84
Total % Assigned	31.42	26.68	30.54	11.36	100

Note. Total % Correct Assignments= 69.93. Average Distribution Error= 1.58. Total % Proficient/Not Proficient Correct Assignments= 88.29.

Table A-21. Grade 6 Form 3 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*22.52*	*6.04*	0.35	< 0.01	28.91
Apprentice	*7.90*	*17.31*	6.95	0.01	32.16
Proficient	0.24	4.30	*22.07*	*2.66*	29.26
Distinguished	< 0.01	< 0.01	*1.77*	*7.89*	9.67
Total % Assigned	30.66	27.64	31.13	10.56	100

Note. Total % Correct Assignments= 69.79. Average Distribution Error= 2.26. Total % Proficient/Not Proficient Correct Assignments= 88.16.

Table A-22. Grade 6 Form 4 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*28.93*	*5.24*	0.58	< 0.01	34.76
Apprentice	*5.95*	*9.59*	5.40	< 0.01	20.94
Proficient	0.45	4.00	*25.28*	*3.01*	32.75
Distinguished	< 0.01	< 0.01	*1.91*	*9.64*	11.55
Total % Assigned	35.33	18.83	33.18	12.66	100

Note. Total % Correct Assignments= 73.44. Average Distribution Error= 1.05. Total % Proficient/Not Proficient Correct Assignments= 89.56.

Table A-23. Grade 6 Form 5 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.44*	*5.37*	0.22	< 0.01	29.02
Apprentice	*6.72*	*16.89*	6.29	0.01	29.90
Proficient	0.17	4.32	*21.72*	*3.11*	29.33
Distinguished	< 0.01	< 0.01	*1.98*	*9.76*	11.74
Total % Assigned	30.33	26.58	30.21	12.89	100

Note. Total % Correct Assignments= 71.80. Average Distribution Error= 1.66. Total % Proficient/Not Proficient Correct Assignments= 88.98.

Table A-24. Grade 6 Form 6 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.25*	*6.15*	0.31	< 0.01	30.71
Apprentice	*7.27*	*16.79*	6.43	0.01	30.51
Proficient	0.21	4.37	*20.79*	*3.09*	28.46
Distinguished	< 0.01	< 0.01	*1.67*	*8.64*	10.32
Total % Assigned	31.73	27.32	29.20	11.75	100

Note. Total % Correct Assignments= 70.47. Average Distribution Error= 1.59. Total % Proficient/Not Proficient Correct Assignments= 88.66.

Table A-25. Grade 7 Form 1 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*36.64*	*7.76*	1.48	< 0.01	45.89
Apprentice	*7.73*	*9.66*	6.83	0.02	24.25
Proficient	0.64	3.38	*17.29*	*2.36*	23.67
Distinguished	< 0.01	< 0.01	*1.34*	*4.85*	6.19
Total % Assigned	45.02	20.81	26.95	7.23	100

Note. Total % Correct Assignments= 68.45. Average Distribution Error= 2.16. Total % Proficient/Not Proficient Correct Assignments= 87.64.

Table A-26. Grade 7 Form 2 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.92*	*5.36*	0.89	< 0.01	30.17
Apprentice	*6.80*	*9.63*	6.60	0.01	23.04
Proficient	0.69	4.48	*26.16*	*3.45*	34.78
Distinguished	< 0.01	< 0.01	*2.27*	*9.72*	12.00
Total % Assigned	31.42	19.48	35.92	13.18	100

Note. Total % Correct Assignments= 69.44. Average Distribution Error= 1.78. Total % Proficient/Not Proficient Correct Assignments= 87.33.

Table A-27. Grade 7 Form 3 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*22.18*	*6.44*	0.45	< 0.01	29.07
Apprentice	*7.79*	*16.45*	7.17	0.01	31.41
Proficient	0.30	4.54	*22.24*	*2.75*	29.83
Distinguished	< 0.01	< 0.01	*1.83*	*7.86*	9.69
Total % Assigned	30.26	27.43	31.68	10.62	100

Note. Total % Correct Assignments= 68.73. Average Distribution Error= 1.99. Total % Proficient/Not Proficient Correct Assignments= 87.54.

Table A-28. Grade 7 Form 4 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.31*	*5.96*	1.01	< 0.01	31.28
Apprentice	*7.59*	*10.18*	6.72	0.01	24.51
Proficient	0.65	4.08	*23.64*	*3.29*	31.67
Distinguished	< 0.01	< 0.01	*2.13*	*10.41*	12.54
Total % Assigned	32.56	20.22	33.50	13.72	100

Note. Total % Correct Assignments= 68.54. Average Distribution Error= 2.14. Total % Proficient/Not Proficient Correct Assignments= 87.51.

Table A-29. Grade 7 Form 5 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.48*	*7.02*	0.48	< 0.01	31.98
Apprentice	*8.12*	*16.35*	6.72	0.02	31.22
Proficient	0.27	4.11	*17.89*	*2.94*	25.20
Distinguished	< 0.01	0.01	*1.98*	*9.61*	11.60
Total % Assigned	32.87	27.49	27.07	12.57	100

Note. Total % Correct Assignments= 68.33. Average Distribution Error= 1.86. Total % Proficient/Not Proficient Correct Assignments= 88.39.

Table A-30. Grade 7 Form 6 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*26.05*	*6.26*	1.02	< 0.01	33.33
Apprentice	*8.20*	*11.50*	7.52	0.01	27.23
Proficient	0.70	4.45	*24.09*	*2.96*	32.20
Distinguished	< 0.01	< 0.01	*1.46*	*5.78*	7.24
Total % Assigned	34.95	22.21	34.09	8.75	100

Note. Total % Correct Assignments= 67.42. Average Distribution Error= 2.51. Total % Proficient/Not Proficient Correct Assignments= 86.29.

Table A-31. Grade 8 Form 1 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*39.31*	*7.69*	1.42	< 0.01	48.43
Apprentice	*6.94*	*8.66*	6.08	0.02	21.70
Proficient	0.60	3.17	*16.20*	*2.22*	22.18
Distinguished	< 0.01	< 0.01	*1.33*	*6.36*	7.69
Total % Assigned	46.86	19.52	25.03	8.59	100

Note. Total % Correct Assignments= 70.53. Average Distribution Error= 1.87. Total % Proficient/Not Proficient Correct Assignments= 88.71.

Table A-32. Grade 8 Form 2 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*30.52*	*6.59*	0.94	< 0.01	38.06
Apprentice	*7.70*	*11.26*	6.97	0.02	25.95
Proficient	0.54	3.89	*19.29*	*2.92*	26.64
Distinguished	< 0.01	0.01	*1.65*	*7.70*	9.36
Total % Assigned	38.77	21.75	28.84	10.64	100

Note. Total % Correct Assignments= 68.76. Average Distribution Error= 2.10. Total % Proficient/Not Proficient Correct Assignments= 87.63.

Table A-33. Grade 8 Form 3 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*28.89*	*6.45*	0.98	< 0.01	36.32
Apprentice	*6.94*	*9.61*	6.05	0.01	22.60
Proficient	0.53	3.57	*20.73*	*2.71*	27.53
Distinguished	< 0.01	< 0.01	*1.90*	*11.65*	13.55
Total % Assigned	36.36	19.62	29.65	14.37	100

Note. Total % Correct Assignments= 70.88. Average Distribution Error= 1.49. Total % Proficient/Not Proficient Correct Assignments= 88.87.

Table A-34. Grade 8 Form 4 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*30.52*	*6.17*	0.71	< 0.01	37.41
Apprentice	*6.50*	*10.33*	5.87	< 0.01	22.71
Proficient	0.41	3.54	*22.03*	*2.74*	28.71
Distinguished	< 0.01	< 0.01	*1.83*	*9.35*	11.17
Total % Assigned	37.43	20.04	30.44	12.09	100

Note. Total % Correct Assignments= 72.22. Average Distribution Error= 1.34. Total % Proficient/Not Proficient Correct Assignments= 89.46.

Table A-35. Grade 8 Form 5 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.51*	*6.49*	1.12	< 0.01	32.12
Apprentice	*8.77*	*12.24*	8.20	0.01	29.22
Proficient	0.67	4.12	*21.78*	*2.79*	29.36
Distinguished	< 0.01	< 0.01	*1.53*	*7.77*	9.30
Total % Assigned	33.95	22.85	32.63	10.57	100

Note. Total % Correct Assignments= 66.30. Average Distribution Error= 3.18. Total % Proficient/Not Proficient Correct Assignments= 85.88.

Table A-36. Grade 8 Form 6 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.99*	*6.31*	1.12	< 0.01	35.42
Apprentice	*6.93*	*9.29*	6.57	0.01	22.80
Proficient	0.71	4.08	*22.70*	*3.30*	30.79
Distinguished	< 0.01	< 0.01	*2.03*	*8.95*	10.98
Total % Assigned	35.63	19.68	32.42	12.27	100

Note. Total % Correct Assignments= 68.94. Average Distribution Error= 1.56. Total % Proficient/Not Proficient Correct Assignments= 87.50.

Table A-37. Grade 10 Form 1 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*31.99*	*8.49*	2.17	< 0.01	42.65
Apprentice	*9.94*	*10.75*	8.27	0.10	29.06
Proficient	0.90	3.53	*13.61*	*2.50*	20.54
Distinguished	< 0.01	0.02	*1.36*	*6.38*	7.75
Total % Assigned	42.83	22.79	25.40	8.98	100

Note. Total % Correct Assignments= 62.72. Average Distribution Error= 3.14. Total % Proficient/Not Proficient Correct Assignments= 85.01.

Table A-38. Grade 10 Form 2 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*21.38*	*6.02*	1.48	< 0.01	28.89
Apprentice	*9.53*	*11.27*	8.79	0.09	29.68
Proficient	1.13	4.95	*20.86*	*4.08*	31.01
Distinguished	< 0.01	0.02	*2.00*	*8.39*	10.42
Total % Assigned	32.05	22.25	33.14	12.56	100

Note. Total % Correct Assignments= 61.90. Average Distribution Error= 3.71. Total % Proficient/Not Proficient Correct Assignments= 83.53.

Table A-39. Grade 10 Form 3 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*19.81*	*5.80*	1.51	< 0.01	27.12
Apprentice	*9.54*	*10.98*	8.78	0.10	29.39
Proficient	1.17	4.82	*20.13*	*4.10*	30.22
Distinguished	< 0.01	0.02	*2.14*	*11.11*	13.26
Total % Assigned	30.51	21.62	32.55	15.32	100

Note. Total % Correct Assignments= 62.01. Average Distribution Error= 3.88. Total % Proficient/Not Proficient Correct Assignments= 83.59.

Table A-40. Grade 10 Form 4 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*20.79*	*5.69*	1.40	0.01	27.88
Apprentice	*10.19*	*12.17*	9.44	0.23	32.03
Proficient	1.27	5.32	*17.92*	*4.20*	28.71
Distinguished	< 0.01	0.05	*2.02*	*9.32*	11.38
Total % Assigned	32.25	23.22	30.77	13.76	100

Note. Total % Correct Assignments= 60.20. Average Distribution Error= 4.40. Total % Proficient/Not Proficient Correct Assignments= 82.29.

Table A-41. Grade 10 Form 5 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.00*	*5.47*	3.08	0.01	35.56
Apprentice	*8.72*	*6.03*	8.12	0.10	22.98
Proficient	1.97	3.69	*20.24*	*3.99*	29.89
Distinguished	< 0.01	0.02	*2.08*	*9.47*	11.57
Total % Assigned	37.70	15.21	33.52	13.57	100

Note. Total % Correct Assignments= 62.74. Average Distribution Error= 3.89. Total % Proficient/Not Proficient Correct Assignments= 83.00.

Table A-42. Grade 10 Form 6 Mathematics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*19.53*	*5.79*	1.50	0.01	26.83
Apprentice	*10.41*	*12.08*	9.39	0.24	32.12
Proficient	1.25	5.13	*17.76*	*4.54*	28.69
Distinguished	< 0.01	0.05	*2.12*	*10.18*	12.36
Total % Assigned	31.20	23.05	30.78	14.97	100

Note. Total % Correct Assignments= 59.55. Average Distribution Error= 4.53. Total % Proficient/Not Proficient Correct Assignments= 82.43.

Table A-43. Grade 3 Form 1 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*28.00*	*5.48*	0.13	< 0.01	33.61
Apprentice	*5.91*	*16.82*	4.99	0.04	27.77
Proficient	0.10	4.08	*15.77*	*3.63*	23.57
Distinguished	< 0.01	0.03	*2.82*	*12.20*	15.05
Total % Assigned	34.01	26.41	23.71	15.87	100

Note. Total % Correct Assignments= 72.78. Average Distribution Error= 0.68. Total % Proficient/Not Proficient Correct Assignments= 90.63.

Table A-44. Grade 3 Form 2 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*26.24*	*3.60*	0.03	< 0.01	29.86
Apprentice	*4.18*	*18.12*	4.25	0.08	26.63
Proficient	0.03	4.30	*14.58*	*4.44*	23.35
Distinguished	< 0.01	0.07	*3.49*	*16.60*	20.15
Total % Assigned	30.45	26.09	22.34	21.12	100

Note. Total % Correct Assignments= 75.54. Average Distribution Error= 0.78. Total % Proficient/Not Proficient Correct Assignments= 91.25.

Table A-45. Grade 3 Form 3 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*21.41*	*4.32*	0.10	< 0.01	25.83
Apprentice	*4.73*	*15.09*	4.64	0.04	24.50
Proficient	0.10	4.71	*19.84*	*4.59*	29.23
Distinguished	< 0.01	0.03	*3.83*	*16.59*	20.45
Total % Assigned	26.24	24.15	28.41	21.21	100

Note. Total % Correct Assignments= 72.93. Average Distribution Error= 0.58. Total % Proficient/Not Proficient Correct Assignments= 90.39.

Table A-46. Grade 3 Form 4 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.99*	*4.44*	0.03	< 0.01	29.47
Apprentice	*4.05*	*16.89*	4.07	0.03	25.03
Proficient	0.03	3.80	*16.63*	*4.14*	24.60
Distinguished	< 0.01	0.03	*3.39*	*17.48*	20.90
Total % Assigned	29.07	25.16	24.12	21.65	100

Note. Total % Correct Assignments= 75.99. Average Distribution Error= 0.44. Total % Proficient/Not Proficient Correct Assignments= 92.01.

Table A-47. Grade 3 Form 5 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*22.50*	*4.03*	0.09	< 0.01	26.62
Apprentice	*4.62*	*15.26*	4.85	0.04	24.78
Proficient	0.11	5.01	*20.91*	*4.97*	31.00
Distinguished	< 0.01	0.03	*3.64*	*13.93*	17.61
Total % Assigned	27.23	24.34	29.49	18.94	100

Note. Total % Correct Assignments= 72.60. Average Distribution Error= 0.97. Total % Proficient/Not Proficient Correct Assignments= 89.87.

Table A-48. Grade 3 Form 6 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.54*	*3.57*	0.06	< 0.01	28.17
Apprentice	*4.47*	*15.80*	4.74	0.03	25.05
Proficient	0.08	4.64	*20.84*	*4.61*	30.16
Distinguished	< 0.01	0.02	*3.31*	*13.29*	16.63
Total % Assigned	29.09	24.03	28.95	17.93	100

Note. Total % Correct Assignments= 74.47. Average Distribution Error= 1.11. Total % Proficient/Not Proficient Correct Assignments= 90.44.

Table A-49. Grade 4 Form 1 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.37*	*4.87*	0.16	< 0.01	32.40
Apprentice	*5.40*	*14.69*	4.96	0.17	25.21
Proficient	0.17	5.15	*14.86*	*5.23*	25.41
Distinguished	< 0.01	0.13	*3.61*	*13.24*	16.98
Total % Assigned	32.94	24.84	23.58	18.64	100

Note. Total % Correct Assignments= 70.16. Average Distribution Error= 1.10. Total % Proficient/Not Proficient Correct Assignments= 89.25.

Table A-50. Grade 4 Form 2 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.78*	*3.37*	0.07	< 0.01	29.22
Apprentice	*4.26*	*14.29*	4.49	0.03	23.08
Proficient	0.09	4.69	*20.40*	*4.81*	30.00
Distinguished	< 0.01	0.03	*3.58*	*14.10*	17.71
Total % Assigned	30.13	22.38	28.54	18.94	100

Note. Total % Correct Assignments= 74.57. Average Distribution Error= 1.08. Total % Proficient/Not Proficient Correct Assignments= 90.59.

Table A-51. Grade 4 Form 3 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.48*	*3.11*	0.05	< 0.01	28.64
Apprentice	*3.83*	*14.33*	4.29	0.07	22.52
Proficient	0.08	4.99	*18.47*	*5.46*	29.00
Distinguished	< 0.01	0.07	*4.16*	*15.61*	19.84
Total % Assigned	29.38	22.51	26.97	21.14	100

Note. Total % Correct Assignments= 73.89. Average Distribution Error= 1.02. Total % Proficient/Not Proficient Correct Assignments= 90.45.

Table A-52. Grade 4 Form 4 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*28.28*	*4.42*	0.10	< 0.01	32.80
Apprentice	*4.80*	*14.58*	4.62	0.04	24.04
Proficient	0.10	4.44	*18.28*	*4.49*	27.31
Distinguished	< 0.01	0.03	*3.29*	*12.53*	15.86
Total % Assigned	33.18	23.47	26.29	17.06	100

Note. Total % Correct Assignments= 73.66. Average Distribution Error= 0.79. Total % Proficient/Not Proficient Correct Assignments= 90.66.

Table A-53. Grade 5 Form 1 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*29.66*	*3.82*	0.02	< 0.01	33.50
Apprentice	*4.07*	*19.06*	4.15	0.06	27.34
Proficient	0.02	4.48	*16.20*	*4.60*	25.30
Distinguished	< 0.01	0.05	*3.14*	*10.67*	13.86
Total % Assigned	33.76	27.41	23.51	15.33	100

Note. Total % Correct Assignments= 75.59. Average Distribution Error= 0.90. Total % Proficient/Not Proficient Correct Assignments= 91.22.

Table A-54. Grade 5 Form 2 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.25*	*3.73*	0.03	< 0.01	28.01
Apprentice	*4.55*	*19.72*	4.70	0.09	29.06
Proficient	0.04	5.00	*16.41*	*4.91*	26.35
Distinguished	< 0.01	0.07	*3.49*	*13.01*	16.58
Total % Assigned	28.83	28.52	24.64	18.01	100

Note. Total % Correct Assignments= 73.40. Average Distribution Error= 1.12. Total % Proficient/Not Proficient Correct Assignments= 90.08.

Table A-55. Grade 5 Form 3 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.95*	*2.83*	0.02	< 0.01	26.80
Apprentice	*3.44*	*16.68*	3.90	0.02	24.05
Proficient	0.02	4.29	*19.91*	*4.39*	28.61
Distinguished	< 0.01	0.02	*4.15*	*16.36*	20.54
Total % Assigned	27.42	23.83	27.98	20.77	100

Note. Total % Correct Assignments= 76.90. Average Distribution Error= 0.43. Total % Proficient/Not Proficient Correct Assignments= 91.72.

Table A-56. Grade 5 Form 4 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.15*	*3.15*	0.02	< 0.01	27.33
Apprentice	*3.79*	*18.49*	4.40	0.07	26.76
Proficient	0.03	5.10	*17.99*	*5.29*	28.42
Distinguished	< 0.01	0.07	*3.99*	*13.44*	17.50
Total % Assigned	27.98	26.82	26.40	18.80	100

Note. Total % Correct Assignments= 74.07. Average Distribution Error= 1.01. Total % Proficient/Not Proficient Correct Assignments= 90.30.

Table A-57. Grade 6 Form 1 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*31.57*	*4.63*	0.04	< 0.01	36.25
Apprentice	*4.85*	*19.48*	4.51	0.26	29.09
Proficient	0.05	4.59	*10.27*	*4.55*	19.46
Distinguished	< 0.01	0.21	*3.16*	*11.83*	15.19
Total % Assigned	36.47	28.91	17.98	16.64	100

Note. Total % Correct Assignments= 73.15. Average Distribution Error= 0.83. Total % Proficient/Not Proficient Correct Assignments= 90.34.

Table A-58. Grade 6 Form 2 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*20.81*	*3.39*	0.06	< 0.01	24.26
Apprentice	*4.64*	*16.18*	4.83	0.03	25.68
Proficient	0.08	5.15	*23.15*	*5.16*	33.54
Distinguished	< 0.01	0.02	*3.63*	*12.87*	16.53
Total % Assigned	25.53	24.74	31.67	18.06	100

Note. Total % Correct Assignments= 73.00. Average Distribution Error= 1.40. Total % Proficient/Not Proficient Correct Assignments= 89.83.

Table A-59. Grade 6 Form 3 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*22.46*	*3.90*	0.03	< 0.01	26.39
Apprentice	*4.85*	*22.50*	5.13	0.24	32.72
Proficient	0.04	5.57	*13.12*	*5.21*	23.95
Distinguished	< 0.01	0.19	*3.59*	*13.16*	16.94
Total % Assigned	27.36	32.16	21.86	18.62	100

Note. Total % Correct Assignments= 71.24. Average Distribution Error= 1.32. Total % Proficient/Not Proficient Correct Assignments= 88.79.

Table A-60. Grade 6 Form 4 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*19.81*	*3.29*	0.02	< 0.01	23.12
Apprentice	*3.77*	*17.27*	4.19	0.08	25.30
Proficient	0.03	5.00	*17.72*	*5.40*	28.15
Distinguished	< 0.01	0.09	*4.59*	*18.75*	23.43
Total % Assigned	23.61	25.65	26.52	24.22	100

Note. Total % Correct Assignments= 73.55. Average Distribution Error= 0.82. Total % Proficient/Not Proficient Correct Assignments= 90.59.

Table A-61. Grade 7 Form 1 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*40.40*	*4.83*	0.34	< 0.01	45.57
Apprentice	*4.92*	*9.88*	4.49	0.15	19.44
Proficient	0.31	4.06	*12.30*	*4.19*	20.86
Distinguished	< 0.01	0.10	*2.88*	*11.15*	14.13
Total % Assigned	45.63	18.87	20.01	15.50	100

Note. Total % Correct Assignments= 73.73. Average Distribution Error= 0.71. Total % Proficient/Not Proficient Correct Assignments= 90.55.

Table A-62. Grade 7 Form 2 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.12*	*4.63*	0.14	< 0.01	29.90
Apprentice	*5.52*	*16.03*	5.38	0.16	27.10
Proficient	0.16	5.25	*15.09*	*4.91*	25.41
Distinguished	< 0.01	0.11	*3.39*	*14.10*	17.60
Total % Assigned	30.80	26.02	24.00	19.17	100

Note. Total % Correct Assignments= 70.34. Average Distribution Error= 1.24. Total % Proficient/Not Proficient Correct Assignments= 88.79.

Table A-63. Grade 7 Form 3 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.66*	*4.10*	0.23	< 0.01	28.99
Apprentice	*5.63*	*13.11*	5.63	0.05	24.41
Proficient	0.27	4.91	*20.05*	*4.37*	29.60
Distinguished	< 0.01	0.03	*3.16*	*13.81*	17.00
Total % Assigned	30.57	22.14	29.06	18.23	100

Note. Total % Correct Assignments= 71.63. Average Distribution Error= 1.40. Total % Proficient/Not Proficient Correct Assignments= 88.89.

Table A-64. Grade 7 Form 4 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.80*	*3.90*	0.21	< 0.01	29.91
Apprentice	*4.52*	*10.85*	4.82	0.04	20.23
Proficient	0.28	5.14	*22.13*	*5.13*	32.69
Distinguished	< 0.01	0.03	*3.48*	*13.66*	17.17
Total % Assigned	30.60	19.92	30.65	18.83	100

Note. Total % Correct Assignments= 72.44. Average Distribution Error= 1.18. Total % Proficient/Not Proficient Correct Assignments= 89.47.

Table A-65. Grade 8 Form 1 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*34.56*	*5.05*	0.39	< 0.01	40.00
Apprentice	*5.60*	*10.88*	5.23	0.08	21.79
Proficient	0.37	4.66	*17.38*	*4.55*	26.97
Distinguished	< 0.01	0.04	*2.59*	*8.61*	11.24
Total % Assigned	40.52	20.64	25.59	13.25	100

Note. Total % Correct Assignments= 71.43. Average Distribution Error= 1.26. Total % Proficient/Not Proficient Correct Assignments= 89.23.

Table A-66. Grade 8 Form 2 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.36*	*4.15*	0.28	< 0.01	29.79
Apprentice	*5.36*	*11.59*	5.42	0.07	22.44
Proficient	0.35	5.21	*20.62*	*5.13*	31.32
Distinguished	< 0.01	0.04	*3.33*	*13.08*	16.45
Total % Assigned	31.07	21.00	29.65	18.28	100

Note. Total % Correct Assignments= 70.65. Average Distribution Error= 1.55. Total % Proficient/Not Proficient Correct Assignments= 88.63.

Table A-67. Grade 8 Form 3 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.79*	*4.53*	0.13	< 0.01	28.44
Apprentice	*5.44*	*16.15*	5.25	0.14	26.99
Proficient	0.15	5.35	*15.88*	*5.19*	26.57
Distinguished	< 0.01	0.10	*3.46*	*14.43*	17.99
Total % Assigned	29.38	26.13	24.72	19.77	100

Note. Total % Correct Assignments= 70.25. Average Distribution Error= 1.36. Total % Proficient/Not Proficient Correct Assignments= 88.87.

Table A-68. Grade 8 Form 4 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.79*	*4.06*	0.19	< 0.01	32.05
Apprentice	*5.07*	*12.20*	4.81	0.09	22.17
Proficient	0.22	4.75	*17.07*	*5.05*	27.10
Distinguished	< 0.01	0.07	*3.56*	*15.06*	18.69
Total % Assigned	33.08	21.09	25.63	20.20	100

Note. Total % Correct Assignments= 72.12. Average Distribution Error= 1.27. Total % Proficient/Not Proficient Correct Assignments= 89.86.

Table A-69. Grade 10 Form 1 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*29.03*	*6.69*	0.38	< 0.01	36.10
Apprentice	*6.35*	*13.58*	5.18	0.13	25.24
Proficient	0.25	4.48	*13.90*	*4.35*	22.98
Distinguished	< 0.01	0.09	*3.17*	*12.42*	15.68
Total % Assigned	35.63	24.84	22.64	16.90	100

Note. Total % Correct Assignments= 68.93. Average Distribution Error= 0.61. Total % Proficient/Not Proficient Correct Assignments= 89.49.

Table A-70. Grade 10 Form 2 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.35*	*4.56*	0.21	< 0.01	28.11
Apprentice	*5.05*	*13.09*	5.34	0.05	23.53
Proficient	0.24	5.30	*21.30*	*4.88*	31.72
Distinguished	< 0.01	0.03	*3.27*	*13.34*	16.64
Total % Assigned	28.63	22.98	30.13	18.27	100

Note. Total % Correct Assignments= 71.08. Average Distribution Error= 1.07. Total % Proficient/Not Proficient Correct Assignments= 88.83.

Table A-71. Grade 10 Form 3 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*21.64*	*4.98*	0.24	< 0.01	26.86
Apprentice	*5.94*	*14.29*	5.66	0.05	25.95
Proficient	0.24	5.06	*20.50*	*4.91*	30.70
Distinguished	< 0.01	0.04	*3.49*	*12.97*	16.49
Total % Assigned	27.82	24.37	29.88	17.93	100

Note. Total % Correct Assignments= 69.39. Average Distribution Error= 1.20. Total % Proficient/Not Proficient Correct Assignments= 88.71.

Table A-72. Grade 10 Form 4 Reading 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.05*	*4.45*	0.22	< 0.01	27.73
Apprentice	*5.27*	*12.54*	5.00	0.05	22.86
Proficient	0.23	4.87	*20.32*	*5.01*	30.43
Distinguished	< 0.01	0.04	*3.77*	*15.17*	18.98
Total % Assigned	28.55	21.91	29.30	20.23	100

Note. Total % Correct Assignments= 71.08. Average Distribution Error= 1.04. Total % Proficient/Not Proficient Correct Assignments= 89.59.

Table A-73. Grade 4 Form 1 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*16.56*	*6.00*	0.07	< 0.01	22.63
Apprentice	*9.83*	*34.64*	7.30	0.17	51.94
Proficient	0.05	4.76	*12.09*	*3.27*	20.17
Distinguished	< 0.01	0.04	*1.20*	*4.03*	5.27
Total % Assigned	26.44	45.43	20.67	7.46	100

Note. Total % Correct Assignments= 67.31. Average Distribution Error= 3.25. Total % Proficient/Not Proficient Correct Assignments= 87.60.

Table A-74. Grade 4 Form 2 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*11.51*	*4.34*	0.02	< 0.01	15.87
Apprentice	*7.65*	*36.48*	7.12	0.18	51.43
Proficient	0.02	5.51	*14.50*	*4.23*	24.26
Distinguished	< 0.01	0.06	*1.90*	*6.47*	8.43
Total % Assigned	19.18	46.39	23.54	10.89	100

Note. Total % Correct Assignments= 68.96. Average Distribution Error= 2.88. Total % Proficient/Not Proficient Correct Assignments= 87.08.

Table A-75. Grade 4 Form 3 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*11.22*	*4.18*	0.01	< 0.01	15.41
Apprentice	*7.39*	*41.97*	7.10	0.10	56.56
Proficient	0.01	5.08	*14.13*	*3.14*	22.36
Distinguished	< 0.01	0.02	*1.24*	*4.41*	5.67
Total % Assigned	18.62	51.25	22.48	7.65	100

Note. Total % Correct Assignments= 71.72. Average Distribution Error= 2.66. Total % Proficient/Not Proficient Correct Assignments= 87.67.

Table A-76. Grade 4 Form 4 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*7.23*	*3.07*	0.01	< 0.01	10.30
Apprentice	*7.86*	*46.07*	7.79	0.09	61.81
Proficient	0.01	5.13	*14.84*	*3.00*	22.97
Distinguished	< 0.01	0.02	*1.12*	*3.78*	4.92
Total % Assigned	15.10	54.28	23.75	6.87	100

Note. Total % Correct Assignments= 71.92. Average Distribution Error= 3.76. Total % Proficient/Not Proficient Correct Assignments= 86.96.

Table A-77. Grade 7 Form 1 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*33.89*	*9.76*	0.15	< 0.01	43.80
Apprentice	*8.35*	*24.00*	5.39	0.01	37.74
Proficient	0.05	3.04	*11.80*	*1.47*	16.36
Distinguished	< 0.01	< 0.01	*0.57*	*1.52*	2.09
Total % Assigned	42.29	36.80	17.91	3.00	100

Note. Total % Correct Assignments= 71.22. Average Distribution Error= 1.23. Total % Proficient/Not Proficient Correct Assignments= 91.36.

Table A-78. Grade 7 Form 2 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*25.01*	*8.52*	0.10	< 0.01	33.63
Apprentice	*9.13*	*29.16*	6.18	0.01	44.47
Proficient	0.04	3.74	*14.80*	*1.51*	20.10
Distinguished	< 0.01	< 0.01	*0.48*	*1.31*	1.79
Total % Assigned	34.18	41.42	21.56	2.83	100

Note. Total % Correct Assignments= 70.28. Average Distribution Error= 1.53. Total % Proficient/Not Proficient Correct Assignments= 89.92.

Table A-79. Grade 7 Form 3 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*26.29*	*7.96*	0.10	< 0.01	34.35
Apprentice	*8.12*	*26.31*	6.00	0.01	40.44
Proficient	0.05	4.07	*16.45*	*1.88*	22.44
Distinguished	< 0.01	< 0.01	*0.76*	*2.01*	2.77
Total % Assigned	34.46	38.34	23.31	3.89	100

Note. Total % Correct Assignments= 71.06. Average Distribution Error= 1.05. Total % Proficient/Not Proficient Correct Assignments= 89.76.

Table A-80. Grade 7 Form 4 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*22.28*	*7.28*	0.04	< 0.01	29.61
Apprentice	*8.06*	*31.40*	5.87	0.01	45.34
Proficient	0.02	4.09	*16.60*	*2.08*	22.80
Distinguished	< 0.01	< 0.01	*0.65*	*1.60*	2.26
Total % Assigned	30.37	42.77	23.17	3.70	100

Note. Total % Correct Assignments= 71.89. Average Distribution Error= 1.28. Total % Proficient/Not Proficient Correct Assignments= 89.97.

Table A-81. Grade 11 Form 1 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*44.41*	*7.96*	0.05	< 0.01	52.42
Apprentice	*7.01*	*27.58*	4.96	0.27	39.82
Proficient	0.02	2.34	*3.89*	*1.15*	7.40
Distinguished	< 0.01	0.01	*0.13*	*0.23*	0.37
Total % Assigned	51.44	37.88	9.03	1.64	100

Note. Total % Correct Assignments= 76.11. Average Distribution Error= 1.45. Total % Proficient/Not Proficient Correct Assignments= 92.36.

Table A-82. Grade 11 Form 2 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.46*	*7.41*	0.06	< 0.01	30.92
Apprentice	*8.70*	*34.80*	7.12	0.11	50.74
Proficient	0.03	4.19	*10.61*	*1.99*	16.83
Distinguished	< 0.01	0.01	*0.45*	*1.05*	1.51
Total % Assigned	32.20	46.41	18.24	3.15	100

Note. Total % Correct Assignments= 69.93. Average Distribution Error= 2.16. Total % Proficient/Not Proficient Correct Assignments= 88.48.

Table A-83. Grade 11 Form 3 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*30.76*	*7.24*	0.17	< 0.01	38.18
Apprentice	*7.88*	*24.17*	7.24	0.16	39.46
Proficient	0.13	5.01	*12.73*	*2.90*	20.77
Distinguished	< 0.01	0.02	*0.51*	*1.07*	1.60
Total % Assigned	38.77	36.44	20.66	4.13	100

Note. Total % Correct Assignments= 68.74. Average Distribution Error= 2.16. Total % Proficient/Not Proficient Correct Assignments= 87.28.

Table A-84. Grade 11 Form 4 Science 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*43.31*	*8.21*	0.07	< 0.01	51.58
Apprentice	*7.42*	*26.13*	5.10	0.09	38.74
Proficient	0.03	2.56	*5.84*	*1.00*	9.43
Distinguished	< 0.01	< 0.01	*0.09*	*0.16*	0.25
Total % Assigned	50.76	36.89	11.10	1.25	100

Note. Total % Correct Assignments= 75.44. Average Distribution Error= 1.34. Total % Proficient/Not Proficient Correct Assignments= 92.16.

Table A-85. Grade 5 Form 1 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*11.02*	*2.76*	0.12	< 0.01	13.90
Apprentice	*3.95*	*10.32*	3.85	0.06	18.18
Proficient	0.15	3.94	*15.50*	*4.48*	24.08
Distinguished	< 0.01	0.06	*4.62*	*39.16*	43.85
Total % Assigned	15.11	17.09	24.10	43.70	100

Note. Total % Correct Assignments= 76.00. Average Distribution Error= 0.62. Total % Proficient/Not Proficient Correct Assignments= 91.82.

Table A-86. Grade 5 Form 2 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*29.07*	*5.28*	0.29	< 0.01	34.64
Apprentice	*6.22*	*14.06*	5.58	0.12	25.98
Proficient	0.26	4.79	*15.49*	*4.39*	24.93
Distinguished	< 0.01	0.06	*2.88*	*11.51*	14.45
Total % Assigned	35.55	24.20	24.24	16.01	100

Note. Total % Correct Assignments= 70.13. Average Distribution Error= 1.23. Total % Proficient/Not Proficient Correct Assignments= 88.90.

Table A-87. Grade 5 Form 3 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*29.26*	*5.17*	0.30	< 0.01	34.73
Apprentice	*6.21*	*14.25*	5.73	0.34	26.53
Proficient	0.31	5.25	*12.87*	*5.46*	23.89
Distinguished	< 0.01	0.20	*3.15*	*11.51*	14.86
Total % Assigned	35.78	24.86	22.05	17.31	100

Note. Total % Correct Assignments= 67.88. Average Distribution Error= 1.76. Total % Proficient/Not Proficient Correct Assignments= 87.88.

Table A-88. Grade 5 Form 4 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*23.92*	*5.37*	0.14	< 0.01	29.43
Apprentice	*6.59*	*19.63*	5.99	0.14	32.35
Proficient	0.13	5.26	*15.47*	*4.60*	25.47
Distinguished	< 0.01	0.08	*2.85*	*9.83*	12.76
Total % Assigned	30.64	30.34	24.45	14.58	100

Note. Total % Correct Assignments= 68.85. Average Distribution Error= 1.52. Total % Proficient/Not Proficient Correct Assignments= 88.26.

Table A-89. Grade 5 Form 5 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*29.63*	*5.86*	0.31	< 0.01	35.81
Apprentice	*6.50*	*15.00*	5.67	0.30	27.47
Proficient	0.26	4.91	*12.43*	*5.10*	22.70
Distinguished	< 0.01	0.17	*2.95*	*10.90*	14.01
Total % Assigned	36.40	25.95	21.36	16.29	100

Note. Total % Correct Assignments= 67.96. Average Distribution Error= 1.43. Total % Proficient/Not Proficient Correct Assignments= 88.37.

Table A-90. Grade 8 Form 1 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*37.61*	*7.94*	1.01	< 0.01	46.58
Apprentice	*6.73*	*10.16*	5.67	0.18	22.74
Proficient	0.53	3.93	*12.27*	*3.92*	20.65
Distinguished	< 0.01	0.07	*2.19*	*7.77*	10.03
Total % Assigned	44.87	22.11	21.14	11.87	100

Note. Total % Correct Assignments= 67.82. Average Distribution Error= 1.17. Total % Proficient/Not Proficient Correct Assignments= 88.60.

Table A-91. Grade 8 Form 2 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*30.68*	*5.95*	0.20	< 0.01	36.84
Apprentice	*5.59*	*14.57*	4.80	0.16	25.12
Proficient	0.16	4.49	*12.45*	*4.28*	21.38
Distinguished	< 0.01	0.12	*3.17*	*13.38*	16.66
Total % Assigned	36.43	25.13	20.63	17.82	100

Note. Total % Correct Assignments= 71.08. Average Distribution Error= 0.58. Total % Proficient/Not Proficient Correct Assignments= 90.06.

Table A-92. Grade 8 Form 3 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*31.08*	*6.43*	0.34	< 0.01	37.85
Apprentice	*6.46*	*14.59*	5.43	0.28	26.76
Proficient	0.26	4.68	*11.45*	*4.56*	20.94
Distinguished	< 0.01	0.17	*2.96*	*11.32*	14.45
Total % Assigned	37.80	25.87	20.18	16.16	100

Note. Total % Correct Assignments= 68.44. Average Distribution Error= 0.86. Total % Proficient/Not Proficient Correct Assignments= 88.85.

Table A-93. Grade 8 Form 4 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.50*	*6.28*	0.25	< 0.01	34.02
Apprentice	*6.21*	*15.39*	5.47	0.09	27.17
Proficient	0.18	4.66	*15.97*	*4.43*	25.25
Distinguished	< 0.01	0.05	*2.77*	*10.74*	13.56
Total % Assigned	33.89	26.39	24.46	15.26	100

Note. Total % Correct Assignments= 69.59. Average Distribution Error= 0.85. Total % Proficient/Not Proficient Correct Assignments= 89.29.

Table A-94. Grade 8 Form 5 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.97*	*5.99*	0.30	< 0.01	34.25
Apprentice	*6.53*	*15.44*	5.82	0.29	28.08
Proficient	0.26	5.00	*12.56*	*4.99*	22.81
Distinguished	< 0.01	0.16	*2.95*	*11.75*	14.86
Total % Assigned	34.76	26.58	21.63	17.03	100

Note. Total % Correct Assignments= 67.71. Average Distribution Error= 1.34. Total % Proficient/Not Proficient Correct Assignments= 88.18.

Table A-95. Grade 11 Form 1 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*39.34*	*6.90*	0.65	0.01	46.90
Apprentice	*5.92*	*10.07*	4.85	0.27	21.11
Proficient	0.44	4.21	*11.29*	*4.78*	20.72
Distinguished	< 0.01	0.17	*2.71*	*8.39*	11.27
Total % Assigned	45.70	21.34	19.51	13.45	100

Note. Total % Correct Assignments= 69.10. Average Distribution Error= 1.20. Total % Proficient/Not Proficient Correct Assignments= 89.41.

Table A-96. Grade 11 Form 2 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*30.39*	*6.78*	0.62	< 0.01	37.79
Apprentice	*7.22*	*13.09*	6.08	0.29	26.68
Proficient	0.44	4.77	*13.18*	*5.17*	23.57
Distinguished	< 0.01	0.15	*2.92*	*8.89*	11.96
Total % Assigned	38.05	24.80	22.80	14.35	100

Note. Total % Correct Assignments= 65.55. Average Distribution Error= 1.33. Total % Proficient/Not Proficient Correct Assignments= 87.64.

Table A-97. Grade 11 Form 3 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.18*	*6.63*	0.36	< 0.01	31.18
Apprentice	*7.88*	*18.19*	6.81	0.35	33.22
Proficient	0.32	5.75	*13.70*	*5.26*	25.04
Distinguished	< 0.01	0.16	*2.66*	*7.74*	10.56
Total % Assigned	32.38	30.73	23.53	13.35	100

Note. Total % Correct Assignments= 63.82. Average Distribution Error= 2.00. Total % Proficient/Not Proficient Correct Assignments= 86.24.

Table A-98. Grade 11 Form 4 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*30.80*	*7.85*	0.68	< 0.01	39.33
Apprentice	*7.39*	*13.51*	6.00	0.26	27.16
Proficient	0.39	4.39	*11.87*	*4.42*	21.07
Distinguished	< 0.01	0.13	*2.75*	*9.56*	12.45
Total % Assigned	38.58	25.88	21.31	14.24	100

Note. Total % Correct Assignments= 65.74. Average Distribution Error= 1.02. Total % Proficient/Not Proficient Correct Assignments= 88.15.

Table A-99. Grade 11 Form 5 Social Studies 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*27.60*	*6.18*	0.36	0.01	34.13
Apprentice	*6.88*	*15.70*	5.92	0.65	29.14
Proficient	0.37	5.84	*11.03*	*6.06*	23.29
Distinguished	< 0.01	0.38	*3.13*	*9.92*	13.43
Total % Assigned	34.84	28.09	20.44	16.63	100

Note. Total % Correct Assignments= 64.25. Average Distribution Error= 1.96. Total % Proficient/Not Proficient Correct Assignments= 86.49.

Table A-100. Grade 5 Form 1 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*26.05*	*4.31*	0.29	< 0.01	30.66
Apprentice	*5.64*	*12.19*	5.26	0.38	23.47
Proficient	0.40	5.60	*13.06*	*6.05*	25.10
Distinguished	< 0.01	0.29	*3.94*	*16.54*	20.77
Total % Assigned	32.09	22.38	22.56	22.97	100

Note. Total % Correct Assignments= 67.84. Average Distribution Error= 1.82. Total % Proficient/Not Proficient Correct Assignments= 87.78.

Table A-101. Grade 5 Form 2 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*17.07*	*3.25*	0.14	< 0.01	20.46
Apprentice	*5.68*	*15.84*	5.98	0.25	27.74
Proficient	0.27	6.58	*17.89*	*6.64*	31.37
Distinguished	< 0.01	0.17	*4.04*	*16.21*	20.43
Total % Assigned	23.01	25.85	28.05	23.09	100

Note. Total % Correct Assignments= 67.01. Average Distribution Error= 2.61. Total % Proficient/Not Proficient Correct Assignments= 86.62.

Table A-102. Grade 5 Form 3 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*18.35*	*4.05*	0.08	< 0.01	22.48
Apprentice	*6.15*	*21.65*	5.49	0.63	33.92
Proficient	0.11	5.84	*9.68*	*5.70*	21.34
Distinguished	< 0.01	0.44	*3.53*	*18.30*	22.26
Total % Assigned	24.62	31.98	18.78	24.63	100

Note. Total % Correct Assignments= 67.98. Average Distribution Error= 2.25. Total % Proficient/Not Proficient Correct Assignments= 87.41.

Table A-103. Grade 8 Form 1 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*29.20*	*5.52*	0.38	< 0.01	35.10

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Apprentice	*6.30*	**13.16**	6.03	0.07	25.56
Proficient	0.33	4.73	**17.62**	*4.00*	26.67
Distinguished	< 0.01	0.03	*2.47*	**10.16**	12.67
Total % Assigned	35.83	23.44	26.50	14.23	100

Note. Total % Correct Assignments= 70.15. Average Distribution Error= 1.15. Total % Proficient/Not Proficient Correct Assignments= 88.43.

Table A-104. Grade 8 Form 2 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	**16.63**	*3.61*	0.09	< 0.01	20.33
Apprentice	*5.61*	**19.19**	6.15	0.13	31.08
Proficient	0.14	6.05	**18.75**	*5.56*	30.50
Distinguished	< 0.01	0.08	*3.48*	**14.53**	18.09
Total % Assigned	22.37	28.94	28.46	20.23	100

Note. Total % Correct Assignments= 69.10. Average Distribution Error= 2.09. Total % Proficient/Not Proficient Correct Assignments= 87.36.

Table A-105. Grade 8 Form 3 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	**17.39**	*3.57*	0.08	< 0.01	21.03
Apprentice	*5.07*	**17.98**	5.90	0.05	29.00
Proficient	0.12	6.12	**24.18**	*5.13*	35.55
Distinguished	< 0.01	0.03	*3.09*	**11.30**	14.42
Total % Assigned	22.58	27.70	33.24	16.47	100

Note. Total % Correct Assignments= 70.85. Average Distribution Error= 1.80. Total % Proficient/Not Proficient Correct Assignments= 87.70.

Table A-106. Grade 11 Form 1 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*24.31*	*5.09*	0.18	< 0.01	29.58
Apprentice	*6.43*	*17.84*	5.51	0.78	30.57
Proficient	0.25	6.50	*10.70*	*6.85*	24.30
Distinguished	< 0.01	0.59	*3.79*	*11.16*	15.54
Total % Assigned	30.99	30.03	20.18	18.80	100

Note. Total % Correct Assignments= 64.02. Average Distribution Error= 2.33. Total % Proficient/Not Proficient Correct Assignments= 86.18.

Table A-107. Grade 11 Form 2 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*19.31*	*3.70*	0.30	< 0.01	23.32
Apprentice	*6.23*	*13.16*	6.20	0.55	26.14
Proficient	0.62	7.45	*17.02*	*8.32*	33.41
Distinguished	0.01	0.49	*5.16*	*11.46*	17.13
Total % Assigned	26.17	24.81	28.69	20.34	100

Note. Total % Correct Assignments= 64.94. Average Distribution Error= 3.03. Total % Proficient/Not Proficient Correct Assignments= 84.37.

Table A-108. Grade 11 Form 3 Editing and Mechanics 2022 Percentages of True Scores Being in Assigned Classification

True Class	Assigned Novice	Assigned Apprentice	Assigned Proficient	Assigned Distinguished	Total % Expected
Novice	*16.72*	*4.06*	0.15	< 0.01	20.93
Apprentice	*5.64*	*16.40*	5.70	0.41	28.16
Proficient	0.23	6.54	*14.94*	*7.09*	28.81
Distinguished	< 0.01	0.39	*5.25*	*16.47*	22.11
Total % Assigned	22.60	27.39	26.04	23.97	100

Note. Total % Correct Assignments= 64.53. Average Distribution Error= 1.77. Total % Proficient/Not Proficient Correct Assignments= 86.56.

Appendix B. Data Cleaning and Analysis

Item-level data from the 2022 KSA administration were provided by KDE, in addition to student-level data for each subject test. For the purpose of our analyses, it was only necessary to analyze item-level data (e.g., item-level scores for Reading, Math, Science, Social Studies and Editing and Mechanics and a form variable indicating the administered test form). Reading and Math data were available for Grades 3-8 and 10. Science data were provided for Grades 4, 7, and 11. Social Studies and Editing and Mechanics data were available for Grades 5, 8, and 11. Raw cut scores were also provided and can be found for each performance classification in bolded font by subject, grade, and test form in Table B-1 below.

Data were cleaned and analyzed using RStudio for R version 4.1.1717. To begin the data cleaning process, item-level data were read into R in Excel format using the *read.xlsx* function of the *openxlsx* package. Data were then filtered to focus on a single subject, grade, and test form (where applicable) at a time. Based on the individual item score variables, raw sum scores were then calculated for each student's subject test using the *rowSums* function of the *dplyr* package. However, before calculating the raw sum scores, specific types of individual item score responses needed to be recoded to missing. These types of scores included:

- *A* = insufficient amount to score

- *B* = non-response

- *F* = non-English

- *I* = illegible

- *O* = off topic

It should be noted that several of these codes only apply to the On-Demand Writing scores which were not analyzed. Rows with all missing data were easily filtered out from the data frame. At this point, the standard deviation (SD) of the raw sum scores for each subject, grade, and test form could be calculated.

Next, a separate data frame was created for the subject, grade, and form of interest that included only the individual item score variables. Cronbach's alpha (α) was then calculated using the *cronbach.alpha* function of the *ltm* package. The Cronbach alpha calculations were not standardized and were calculated using the following formula:

$$\alpha = \frac{p}{p-1}\left(1 - \frac{\sum_{i-1}^{p} \sigma_{y_i}^2}{\sigma_x^2}\right)$$

where p is the number of items, $\sigma_{y_i}^2$ is the variance of the ith item, and σ_x^2 is the variance of the observed total test scores.

Classification accuracy was measured via a series of calculations in Excel. The first calculation, a pseudo *z*-score, was based off the individual raw sum scores or *observed scores*, the minimum and maximum values of the raw cut score ranges for each performance classification, and the Standard Error of Measurement (SEM) that was calculated using the SD and Cronbach's alpha values that were previously calculated in R. For reference, these raw cut score ranges are provided by subject, grade, and form in Table B-1 below.

Table B-1. 2022 Raw Cut Scores Ranges by Subject, Grade, and Form

Subject/Grade/Form	Novice	Apprentice	Proficient	Distinguished
MA 03 Form 1	0-17	**18**-24	**25**-32	**33**-38
MA 03 Form 2	0-16	**17**-23	**24**-31	**32**-38
MA 03 Form 3	0-16	**17**-23	**24**-31	**32**-38
MA 03 Form 4	0-16	**17**-23	**24**-31	**32**-38
MA 03 Form 5	0-16	**17**-24	**25**-32	**33**-38
MA 03 Form 6	0-16	**17**-24	**25**-31	**32**-38
MA 04 Form 1	0-15	**16**-21	**22**-29	**30**-36
MA 04 Form 2	0-14	**15**-20	**21**-28	**29**-36
MA 04 Form 3	0-15	**16**-21	**22**-29	**30**-36
MA 04 Form 4	0-15	**16**-21	**22**-28	**29**-36
MA 04 Form 5	0-16	**17**-21	**22**-29	**30**-36
MA 04 Form 6	0-15	**16**-21	**22**-28	**29**-36
MA 05 Form 1	0-13	**14**-19	**20**-27	**28**-36
MA 05 Form 2	0-12	**13**-19	**20**-28	**29**-36
MA 05 Form 3	0-12	**13**-19	**20**-28	**29**-36
MA 05 Form 4	0-12	**13**-19	**20**-28	**29**-36
MA 05 Form 5	0-13	**14**-20	**21**-29	**30**-36
MA 05 Form 6	0-12	**13**-19	**20**-28	**29**-36
MA 06 Form 1	0-11	**12**-16	**17**-25	**26**-36
MA 06 Form 2	0-11	**12**-16	**17**-24	**25**-36
MA 06 Form 3	0-10	**11**-15	**16**-24	**25**-36
MA 06 Form 4	0-11	**12**-15	**16**-24	**25**-36
MA 06 Form 5	0-11	**12**-16	**17**-24	**25**-36
MA 06 Form 6	0-10	**11**-15	**16**-23	**24**-36
MA 07 Form 1	0-11	**12**-15	**16**-24	**25**-36
MA 07 Form 2	0-11	**12**-15	**16**-24	**25**-36
MA 07 Form 3	0-10	**11**-15	**16**-24	**25**-36
MA 07 Form 4	0-10	**11**-14	**15**-23	**24**-36
MA 07 Form 5	0-10	**11**-15	**16**-23	**24**-36
MA 07 Form 6	0-11	**12**-15	**16**-24	**25**-36
MA 08 Form 1	0-11	**12**-15	**16**-24	**25**-36
MA 08 Form 2	0-11	**12**-15	**16**-23	**24**-36
MA 08 Form 3	0-10	**11**-14	**15**-23	**24**-36
MA 08 Form 4	0-10	**11**-14	**15**-23	**24**-36
MA 08 Form 5	0-10	**11**-14	**15**-23	**24**-36
MA 08 Form 6	0-10	**11**-14	**15**-23	**24**-36
MA 10 Form 1	0-9	**10**-13	**14**-21	**22**-36
MA 10 Form 2	0-10	**11**-14	**15**-22	**23**-36
MA 10 Form 3	0-9	**10**-13	**14**-21	**22**-36
MA 10 Form 4	0-10	**11**-14	**15**-21	**22**-36
MA 10 Form 5	0-10	**11**-13	**14**-21	**22**-36
MA 10 Form 6	0-9	**10**-13	**14**-20	**21**-36

Table B-1. (Continued)

Subject/Grade/Form	Novice	Apprentice	Proficient	Distinguished
RD 03 Form 1	0-15	**16**-21	**22**-28	**29**-39
RD 03 Form 2	0-15	**16**-22	**23**-28	**29**-38
RD 03 Form 3	0-14	**15**-20	**21**-27	**28**-38
RD 03 Form 4	0-13	**14**-20	**21**-27	**28**-38
RD 03 Form 5	0-13	**14**-19	**20**-26	**27**-36
RD 03 Form 6	0-15	**16**-21	**22**-28	**29**-38
RD 04 Form 1	0-15	**16**-21	**22**-27	**28**-38
RD 04 Form 2	0-16	**17**-22	**23**-29	**30**-39
RD 04 Form 3	0-18	**19**-24	**25**-30	**31**-40
RD 04 Form 4	0-16	**17**-22	**23**-29	**30**-40
RD 05 Form 1	0-17	**18**-24	**25**-30	**31**-39
RD 05 Form 2	0-19	**20**-26	**27**-32	**33**-42
RD 05 Form 3	0-18	**19**-25	**26**-32	**33**-41
RD 05 Form 4	0-19	**20**-26	**27**-32	**33**-41
RD 06 Form 1	0-17	**18**-24	**25**-29	**30**-39
RD 06 Form 2	0-15	**16**-21	**22**-28	**29**-40
RD 06 Form 3	0-16	**17**-23	**24**-28	**29**-41
RD 06 Form 4	0-15	**16**-22	**23**-28	**29**-39
RD 07 Form 1	0-17	**18**-22	**23**-28	**29**-40
RD 07 Form 2	0-16	**17**-22	**23**-28	**29**-41
RD 07 Form 3	0-15	**16**-20	**21**-27	**28**-40
RD 07 Form 4	0-15	**16**-20	**21**-27	**28**-39
RD 08 Form 1	0-15	**16**-20	**21**-27	**28**-38
RD 08 Form 2	0-16	**17**-21	**22**-28	**29**-40
RD 08 Form 3	0-15	**16**-21	**22**-27	**28**-40
RD 08 Form 4	0-17	**18**-22	**23**-28	**29**-40
RD 10 Form 1	0-13	**14**-19	**20**-26	**27**-38
RD 10 Form 2	0-15	**16**-21	**22**-29	**30**-41
RD 10 Form 3	0-14	**15**-20	**21**-28	**29**-40
RD 10 Form 4	0-15	**16**-21	**22**-29	**30**-41
SC 04 Form 1	0-9	**10**-16	**17**-22	**23**-38
SC 04 Form 2	0-9	**10**-17	**18**-23	**24**-37
SC 04 Form 3	0-8	**9**-16	**17**-22	**23**-36
SC 04 Form 4	0-9	**10**-18	**19**-25	**26**-41
SC 07 Form 1	0-9	**10**-16	**17**-25	**26**-36
SC 07 Form 2	0-8	**9**-15	**16**-24	**25**-36
SC 07 Form 3	0-9	**10**-16	**17**-25	**26**-36
SC 07 Form 4	0-10	**11**-18	**19**-27	**28**-38
SC 11 Form 1	0-13	**14**-22	**23**-28	**29**-36
SC 11 Form 2	0-9	**10**-17	**18**-24	**25**-34
SC 11 Form 3	0-11	**12**-18	**19**-25	**26**-35
SC 11 Form 4	0-12	**13**-20	**21**-27	**28**-35

Table B-1. (Continued)

Subject/Grade/Form	Novice	Apprentice	Proficient	Distinguished
SS 05 Form 1	0-12	**13**-17	**18**-23	**24**-34
SS 05 Form 2	0-14	**15**-19	**20**-25	**26**-35
SS 05 Form 3	0-13	**14**-18	**19**-23	**24**-34
SS 05 Form 4	0-13	**14**-19	**20**-25	**26**-35
SS 05 Form 5	0-14	**15**-19	**20**-24	**25**-34
SS 08 Form 1	0-12	**13**-17	**18**-24	**25**-36
SS 08 Form 2	0-13	**14**-19	**20**-25	**26**-37
SS 08 Form 3	0-14	**15**-20	**21**-26	**27**-38
SS 08 Form 4	0-12	**13**-18	**19**-25	**26**-38
SS 08 Form 5	0-14	**15**-20	**21**-26	**27**-38
SS 11 Form 1	0-15	**16**-21	**22**-28	**29**-40
SS 11 Form 2	0-14	**15**-20	**21**-27	**28**-39
SS 11 Form 3	0-14	**15**-21	**22**-28	**29**-41
SS 11 Form 4	0-13	**14**-19	**20**-26	**27**-39
SS 11 Form 5	0-16	**17**-23	**24**-29	**30**-41
EM 05 Form 1	0-15	**16**-20	**21**-25	**26**-36
EM 05 Form 2	0-16	**17**-21	**22**-26	**27**-36
EM 05 Form 3	0-14	**15**-20	**21**-24	**25**-36
EM 08 Form 1	0-13	**14**-18	**19**-25	**26**-36
EM 08 Form 2	0-14	**15**-20	**21**-26	**27**-36
EM 08 Form 3	0-14	**15**-20	**21**-27	**28**-36
EM 11 Form 1	0-15	**16**-22	**23**-27	**28**-36
EM 11 Form 2	0-16	**17**-22	**23**-28	**29**-36
EM 11 Form 3	0-14	**15**-21	**22**-27	**28**-36

Note. Cut scores within a subject may differ by form. Bolded font represents the specific raw cut score for the given performance classification.

For each combination of the individual raw scores and the minimum or maximum values of the raw cut score ranges, the following *z*-score was computed:

$$z = \frac{X_{cs} - X_i}{SD\sqrt{1 - \alpha}}$$

where X_{cs} is the minimum or maximum value of a specific raw cut score range and X_i is the individual raw sum score. The denominator, $SD\sqrt{1 - \alpha}$, is the SEM calculation where SD is the standard deviation of the raw sum scores and Cronbach's alpha (α) is the reliability estimate for the set of individual item scores for a given subject, grade, and form.

These values indicate how many standard errors there are between the minimum or maximum value of the specific raw cut score range and the individual raw score and place the differences on the same scale. Negative values reflect raw scores that were above the cut score. Similarly, positive values reflect raw scores that were below the cut score.

For example, a table with a sample of these calculations for Math Grade 3 Form 1 is provided below.

Table B-2. Sample Z-Score Calculations for Math Grade 3 Form 1

Raw Score	SEM	Nov Min	Nov Max	App Min	App Max	Prof Min	Prof Max	Dist Min	Dist Max
0.00	3.60	**0.00**	4.72	5.00	6.67	6.95	8.89	9.17	10.56
1.00	3.60	-0.28	4.45	4.72	6.39	6.67	8.61	8.89	10.28
2.00	3.60	-0.56	4.17	4.45	6.11	6.39	8.34	8.61	10.00
3.00	3.60	-0.83	3.89	4.17	5.84	6.11	8.06	8.34	9.73
4.00	3.60	-1.11	3.61	3.89	5.56	5.84	7.78	8.06	9.45
5.00	3.60	-1.39	3.33	3.61	5.28	5.56	7.50	7.78	9.17
.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.

Note. In the actual calculations, values were not rounded. The calculation for the bolded value = (0-0/3.60)

Then, the scores were placed on the normal distribution curve with a specified mean of 0, standard deviation of 1, and the distribution type set to Cumulative Normal Distribution Function. A sample of these values after the normal distribution calculation can be found in Table B-3.

Table B-3. Sample Normally Distributed Values for Math Grade 3 Form 1

Raw Score	Nov Min	Nov Max	App Min	App Max	Prof Min	Prof Max	Dist Min	Dist Max
0	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1	0.39	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	0.29	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3	0.20	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4	0.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5	0.08	1.00	1.00	1.00	1.00	1.00	1.00	1.00
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.

Note. In the actual calculations, values were not rounded.

Next, the normally distributed values corresponding to the minimum of the raw cut score ranges were subtracted from the respective normally distributed maximum values of the raw cut score ranges (e.g., column 10 – column 0 in Table B-3). The new differences were then multiplied by the number of students who obtained each raw score. A sample of these calculations can be found in Table B-4 below.

Table B-4. Sample Classifications by Raw Score and Performance Classification for Math Grade 3 Form 1

Raw Score	Number of Students	Novice	Apprentice	Proficient	Distinguished
0	15	7.50	0.00	0.00	0.00
1	22	13.41	0.00	0.00	0.00
2	21	14.93	0.00	0.00	0.00
3	18	14.36	0.00	0.00	0.00
4	26	22.53	0.00	0.00	0.00
5	40	36.69	0.01	0.00	0.00
.	.	.	.	.	.
.	.	.	.	.	.

Note. In the actual calculations, values were not rounded. As previously described, the values in the performance classification columns were obtained by multiplying the number of students by the difference in the upper and lower bounds of each raw cut score range.

For each performance classification, summing the values for the corresponding raw cut score range will yield the number of students who were correctly classified into that performance category. For example, for the Novice performance classification, summing the rows in the Novice column corresponding to the raw scores of 0-17 would yield the number of students who were correctly classified as Novice. As an additional example, for the Apprentice performance classification, summing the rows in the Apprentice column corresponding to the raw scores of 18-24 would yield the number of students who were correctly classified as Apprentice.

On the other hand, summing the values in a specific performance classification column that correspond to a different raw cut score range would yield the number of students who were misclassified (i.e., assigned to the column's performance classification but expected to perform according to the raw cut score range). To provide a couple examples, summing the values in the Novice performance classification column that correspond to the raw cut score range of 18-24 (i.e., Apprentice) would give the number of students who were assigned to the Novice performance classification, but expected to perform at the Apprentice level. Additionally, summing the values in the Apprentice performance classification that correspond to the raw cut score range of 25-32 (i.e., Proficient) gives the number of students who were assigned to the Apprentice performance classification, but expected to perform at the Proficient level.

Any of these classifications can be converted to a percentage by dividing by the total number of classifications, or the sum of the number of students across each raw score and performance classification. Finally, the total number or percentage of correct classifications can be calculated by summing the number or percentage of students who were correctly classified into each performance category.