



An Investigation of the Stability of Kentucky's End-of-Course Assessments

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Executive Summary

The Kentucky Department of Education (KDE) asked the Human Resources Research Organization (HumRRO) to assess the validity of the Quality Core (QC) End-of-Course (EOC) cut scores set in 2012 across the 2013, 2014, and 2015 school years. HumRRO applied the cut scores to the QC and ACT student data, assessed longitudinal trends, continuity, and validity. Although, there have been small improvements in students' ACT performance, EOC scores remained relatively stable between 2013 and 2015. Benchmarks set in place by the Council on Postsecondary Education (CPE) were based on the ACT performance of students attending colleges and universities within Kentucky. This set of benchmarks has continued to serve as a reliable tool for establishing EOC cut scores for the Novice, Apprentice, Proficient, and Distinguished (NAPD) proficiency categories. Overall, this report provides support for the validity of interpretations of the EOC scores and proficiency classifications.

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Table of Contents

Introduction	1
Methods and Results	2
Conclusions	16
References.....	17

List of Tables

Table 1. Comparison of ACT and CPE Benchmarks for College Readiness	1
Table 2. EOC English 10 Scores by Proficiency Category 2012-15	3
Table 3. EOC Algebra II Scores by Proficiency Category 2012-15	3
Table 4. EOC Biology Scores by Proficiency Category 2012-15	3
Table 5. EOC U.S. History Scores by Proficiency Category 2012-15	4
Table 6. Mean EOC Scores 2013-2015	4
Table 7. Mean ACT Scores 2013-2015	5
Table 8. Relationships Between EOC and ACT Scores 2013-15: Pearson Correlation Coefficients	6
Table 9. Percentiles of ACT & EOC Scale Scores by NAPD Categories	7

List of Figures

Figure 1. English 10 2013 scale score histogram.	10
Figure 2. English 10 2014 scale score histogram.	11
Figure 3. English 10 2015 scale score histogram.	11
Figure 4. Algebra II 2013 scale score histogram.....	12
Figure 5. Algebra II 2014 scale score histogram.....	12
Figure 6. Algebra II 2015 scale score histogram.....	13
Figure 7. Biology 2013 scale score histogram.	13
Figure 8. Biology 2014 scale score histogram.	14
Figure 9. Biology 2015 scale score histogram.	14
Figure 10. U.S. History 2013 scale score histogram.....	15
Figure 11. U.S. History 2014 scale score histogram.....	15
Figure 12. U.S. History 2015 scale score histogram.....	16

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Introduction

In 2012, the Human Resources Research Organization (HumRRO) conducted a policy capture focus group among education stakeholders to recommend cut scores for high school end-of-course (EOC) exams in English II, Algebra II, U.S. History, and Biology for the Kentucky Department of Education (KDE; Thacker, Dickinson & Sinclair, 2013). The EOC scores were nationally normed, so students received scale scores and the percentile at which their scores ranked compared to a national sample. These scores did not, however, include information for classifying students into Kentucky’s proficiency categories: Novice, Apprentice, Proficient, and Distinguished (NAPD). The 2012 study was designed to provide recommendations to KDE regarding the placement of the cut scores used to classify students. This study investigates the stability of those scores and verifies that score interpretations based on the NAPD categories are essentially the same as they were in 2012.

The 2012 study was informed by a prior report on setting standards for assigning student-level grades for the EOC exams (Thacker, 2011). The 2012 study built on the prior study and included modifications for assigning grades to students as well. The reevaluation of grade assignment occurred as a natural outgrowth of assigning NAPD cut scores and the desire to send a consistent message to students. NAPD cut scores and grade cut scores were intentionally kept consistent for the EOC exams.

The 2012 study was also informed by data collected by ACT and the Council on Postsecondary Education (CPE). ACT publishes indicators (or benchmarks) for college readiness based on scores from their college admissions assessment, also called the ACT. These scores represent the prediction for how likely students are to succeed in their early college courses. CPE provides similar indicators to those from ACT, but based on data collected only from Kentucky colleges and universities. The indicators are both based on ACT scores and are very similar, but not exactly the same. The EOC assessment cut scores were intentionally linked to the CPE cut score indicators for college success. The ACT and CPE benchmarks are presented in Table 1. Kentucky’s system of assessment and accountability is based on ensuring that students leave high school prepared for college or career.

Table 1. Comparison of ACT and CPE Benchmarks for College Readiness

EOC Exam	Linked ACT Assessment	ACT Benchmark	CPE Benchmark
English II	English	18	18
Algebra II	Math	22	19
U.S. History	Reading	21	20
Biology	Science	24	22

As Table 1 shows, there are no ACT assessments designed to measure exactly the same content as the EOC assessments. ACT links the EOC assessments to the ACT assessments that best represent the content of the EOC in their technical documentation for the EOCs. The same links were used here. Certainly, there is additional science content beyond Biology on the ACT science assessment, but there should be a strong correlation between students’ scores on

the Biology EOC and the ACT science assessment. The 2012 study, like the linking studies performed by ACT, took advantage of those relations.

The current study was designed to check that the links established in 2012 remain viable for the EOCs today. This does not mean that we expected students' scores to remain exactly the same from year to year. It is certainly possible for a larger proportion of students to score in the higher categories if their instruction improved and they knew more relevant content than their counterparts from earlier years. This would not change the interpretation of the scores. This study instead examines the comparisons between the EOC scores and ACT scores, which were the basis for setting the original NAPD cut scores. To accomplish this check, HumRRO applied the cut scores to students' EOC results for 2013, 2014, and 2015 and assessed the distributions for longitudinal trends, equality, continuity, and validity as indicators of college readiness.

Methods and Results

Previously established cut scores (Thacker, Dickinson & Sinclair, 2013) were applied to the EOC and ACT student scores across 2012-2015. Tables 2-5 below display the numbers of students, by year, scoring in each proficiency category. In addition, a simple percentage is also provided in the tables to facilitate easy interpretation. If we read across the rows in the tables, we see that students have scored very consistently across years on the EOC assessments. The small fluctuations are expected and they suggest that the EOC scores are very stable for Kentucky's student population across years.

Tables 2-5, containing only percentages or proportions, include 2012. Later tables that include scale score information do not include 2012. This is because the scale changed in 2013. Kentucky used a "super-score" in 2012. This score was established to account for Kentucky students taking an additional section of the EOC assessments (a constructed response section) in 2012. In 2013 and in subsequent years, the EOCs did not include the constructed response section and used the more traditional ACT Quality Core scale scores. Potential score changes that might have occurred due to the elimination of the constructed response section are not investigated in this report. ACT uses multiple configurations of the EOC assessments, some that include constructed response sections and some that do not. They report interchangeable scale scores from these configurations. Kentucky required a super scale score because students took three sections of the EOCs in 2012, rather than the two on which ACT's scoring tables are based. Kentucky continues to administer two parallel forms of the EOC assessments but, because the forms are equated, that should not impact the results reported here.

We might expect some improvement in scores across years due to potential changes in instruction and curriculum. This is especially true for U.S. History, which is a comprehensive EOC test. Kentucky schools have traditionally split U.S. History in the curriculum between middle and high school grades. The middle school class covers settlement through post-Civil War reconstruction and high school covers from reconstruction through present time. If high schools began to include a review of middle school content, we might expect to see an increase in scores.

Kentucky's accountability system includes incentives to reduce the number of students scoring in the Novice category. It also promotes schools' efforts to produce as many students who score in the Proficient category as possible. We might therefore expect to see changes within specific ranges of the scale. The data in Tables 2-5 shows a small overall decrease in the proportions of students scoring Novice, as well as an overall trend for more students to score in the Proficient category.

Table 2. EOC English 10 Scores by Proficiency Category 2012-15

	2012	2013	2014	2015
English 10				
Novice	17,246 (36.4%)	15,980 (34.1%)	15,884 (33.2%)	16,066 (33.2%)
Apprentice	5,232 (11.0%)	4,593 (9.8%)	5,142 (10.7%)	4,301 (8.9%)
Proficient	19,779 (41.8%)	21,307 (45.5%)	20,090 (42.0%)	21,792 (45.0%)
Distinguished	5,117 (10.8%)	4,993 (10.7%)	6,741 (14.1%)	6,239 (12.9%)
Total	47,374	46,873	47,857	48,398

Table 3. EOC Algebra II Scores by Proficiency Category 2012-15

	2012	2013	2014	2015
Algebra II				
Novice	10,609 (26.4%)	10,859 (24.9%)	10,354 (23.6%)	9,900 (22.1%)
Apprentice	13,362 (33.3%)	17,017 (39.1%)	16,703 (38.1%)	17,376 (38.7%)
Proficient	13,452 (33.5%)	11,980 (27.5%)	12,380 (28.2%)	13,758 (30.7%)
Distinguished	2,694 (6.7%)	3,618 (8.3%)	4,451 (10.1%)	3,829 (8.5%)
Total	40,117	43,474	43,888	44,863

Table 4. EOC Biology Scores by Proficiency Category 2012-15

	2012	2013	2014	2015
Biology				
Novice	11,233 (25.0%)	9,194 (20.2%)	9,429 (20.5%)	8,875 (19.2%)
Apprentice	20,300 (45.1%)	19,861 (43.6%)	18,164 (39.4%)	18,717 (40.4%)
Proficient	10,751 (23.9%)	12,867 (28.2%)	15,000 (32.6%)	14,612 (31.6%)
Distinguished	2,694 (6.0%)	3,655 (8.0%)	3,479 (7.6%)	4,088 (8.8%)
Total	44,978	45,577	46,072	46,292

Table 5. EOC U.S. History Scores by Proficiency Category 2012-15

	2012	2013	2014	2015
	U.S. History			
Novice	16,117 (37.4%)	13,568 (32.0%)	10,458 (24.3%)	11,631 (25.9%)
Apprentice	9,859 (22.9%)	7,023 (16.5%)	7,367 (17.1%)	7,243 (16.1%)
Proficient	11,412 (26.5%)	15,121 (35.6%)	20,153 (46.7%)	19,645 (43.7%)
Distinguished	5,663 (13.2%)	6,740 (15.9%)	5,135 (11.9%)	6,453 (14.3%)
Total	43,051	42,452	43,113	44,972

Another way to consider the data is to evaluate the change in means across years. This is complicated by a change in scale that occurred between 2012 and 2013. In 2012, scores were based on a “super-score” that included two multiple-choice sections and one constructed response section of the EOCs. The constructed response section was dropped in 2013 to facilitate more rapid reporting and the scale reverted to the more typical Quality Core EOC scores reported by ACT. For this reason, Table 6 includes only EOC scores from 2013-15.

Table 6 shows that the mean EOC scores for Kentucky’s student population have changed very little since 2013. There is a very small upward trend, but the mean scores have remained very stable. This provides further evidence that the original cut scores are likely still reasonable. It also demonstrates that, overall, there has been little performance improvement in any of the EOC subjects during this period. This is true despite small decreases in the proportion of Novice students and the small increase in the proportion of Proficient students.

Table 6. Mean EOC Scores 2013-2015

	2013	2014	2015
English 10	153.76	154.10	154.00
Algebra II	145.90	146.36	146.28
Biology	151.22	151.40	151.84
U.S. History	147.15	147.73	147.51

In addition to the EOC scores themselves, it is also helpful to consider the ACT scores on which they were linked. The panels of experts who set the EOC cut scores based their decisions on important score points on the ACT scale. The most important of these was the CPE benchmark, which was linked to the Proficient cut score. If ACT scores fluctuated greatly during this same period, we might become concerned that the interpretation of the cut scores could change over time. We can start by simply evaluating the means on the ACT during the years in question. All Kentucky students take the ACT in grade 11.

Table 7 shows that ACT scores for all subjects have had small but steady increases in each year since 2012. These increases are all less than 1 point for all indicated years combined. This is one indication that the scores referenced by the panelists can be interpreted for 2015 in much the same way as they were in 2012.

Table 7. Mean ACT Scores 2013-2015

	2012	2013	2014	2015
English	18.40	18.42	18.76	18.99
Math	18.80	18.88	19.17	18.83
Science	19.09	19.51	19.66	19.39
Reading	19.05	19.45	19.57	19.79

As previously mentioned, we can assume that a strong correlation exists between an EOC assessment and the ACT assessment that best represents the same content in the technical documentation for the EOC. The links between corresponding ACT and EOC assessments were established in 2012, so it is useful to examine the strength of the relationships between ACT and EOC scores for the following three years. As Table 8 shows, moderate-strong, statistically significant relationships are present between each pair of EOC and ACT assessments between 2013-15.

Looking at Table 8, we notice several patterns. We observe strong, positive relationships between the EOC English 10 and ACT English assessments in years 2013 ($r = .80$) and 2014 ($r = .80$). However, a somewhat weaker relationship is present between the same assessments in 2015 ($r = .67$). We should also take into consideration that this is the group with the smallest sample size ($n = 1,196$). Between 2013 and 2015, both EOC Biology and EOC U.S. History assessments show very stable, positive relationships with the ACT assessments that correspond to their respective academic subjects ($r \approx .70$ for both assessments).

Although moderate-strong relationships are present between each of the EOC and ACT assessments, we see over time that the relationships between the EOC Algebra II and ACT Math assessments are somewhat weaker. The strength of the relationship between EOC Algebra II and ACT Math increases from 2013 ($r = .67$) to 2014 ($r = .72$). However, this relationship weakens again in 2015 ($r = .57$). We can attribute this relationship to the lack of ACT Math score data available from 2014 and 2015 which, if present, could have strengthened the relationship between 2015 EOC Algebra II and ACT Math scores. Despite these small decreases, it is safe to say that the links between corresponding ACT and EOC assessments that were established in 2012 remain strong in the subsequent academic years.

Table 8. Relationships Between EOC and ACT Scores 2013-15: Pearson Correlation Coefficients

	EOC English 10 2013	EOC English 10 2014	EOC English 10 2015
ACT English	0.80 (39,279)	0.80 (40, 469)	0.67 (1,196) ¹
	EOC Algebra II 2013	EOC Algebra II 2014	EOC Algebra II 2015
ACT Math	0.67 (35,391)	0.72 (38,039)	0.57 (28,620)
	EOC Biology 2013	EOC Biology 2014	EOC Biology 2015
ACT Science	0.70 (37,978)	0.70 (33,273)	0.71 (8,232)
	EOC U.S. History 2013	EOC U.S. History 2014	EOC U.S. History 2015
ACT Reading	0.70 (37,369)	0.71 (39,026)	0.69 (39,784)

Note. Included values represent: correlation coefficient (sample size).

The final step in evaluating the stability of EOC cut scores was to examine the full distributions of scores for all EOC assessments across years. For this step, we omitted results from 2012 because of the differing scale. Scores from this year were based on a “super-score” that included multiple-choice and constructed response sections of the EOCs. The scale difference makes interpreting year-to-year changes impossible and the super-scores were discontinued before there was enough data to create a trend. Table 9 contains the full data sets for EOC and ACT by increasing percentile score and proficiency category. This table can be interpreted by reading the percentile in the far left column. This is the proportion of students who scored below an individual scoring in that specific percentile. For example, if a 2013 ACT Math score of 32 is reported to be in the 99th percentile, then the test-taker scoring a 32 scored higher than 99% of the other students completing the 2013 ACT Math assessment.

The EOC test scores are color coded to indicate the positioning of the Novice, Apprentice, Proficient, and Distinguished (NAPD) proficiency categories. Examining the area where the colors change lets us review how consistent the percentiles between EOC and ACT tests have remained across the indicated years. The EOC benchmarks are in bold to further help distinguish any differences that might have occurred across years. In 2012, the CPE benchmarks were matched to the cut score for Proficient using tables similar to these. Note that these benchmarks are slightly different from the original ACT benchmarks as the CPE benchmarks are based on data exclusively from students attending colleges and universities within Kentucky.

Table 9 provides another indication that interpretations of score categories from the EOC assessments have remained reasonably stable with regard to ACT percentiles. There was some fluctuation- fewer students are scoring in the Novice proficiency category and an increased number of students are scoring in the Proficient category. Though the trend holds from 2013 through 2015, these fluctuations are never more than a few points in either direction across the years. This data reinforces earlier information gathered for the various cut scores.

¹ Students typically take the English EOC in grade 10. There were very few students with matched ACT scores for 2015 because most would take the ACT in grade 11, or in 2016.

Table 9. Percentiles of ACT & EOC Scale Scores by NAPD Categories

Percentile	N			A			P			D			Math/Algebra II			Science/Biology			Reading/U.S. History			English/English 10								
													ACT			EOC			ACT			EOC			ACT			EOC		
	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15
0%	1	1	1	125	125	125	1	3	1	125	125	125	1	1	1	125	125	125	1	1	2	125	125	125						
1%	13	13	12	136	137	137	10	9	9	138	138	138	9	10	9	137	137	137	7	8	8	138	139	138						
2%	13	13	13	137	138	138	10	10	10	139	139	139	10	10	10	138	138	138	8	8	8	139	140	140						
3%	14	14	13	137	138	138	11	11	10	140	139	140	11	11	11	138	139	138	8	9	9	140	140	141						
4%	14	14	14	138	139	139	12	11	11	140	140	140	11	11	12	139	139	139	9	9	9	141	141	141						
5%	14	14	14	138	139	139	12	12	11	141	140	141	11	12	12	139	140	139	9	9	10	142	142	142						
6%	14	14	14	139	139	140	12	12	12	142	141	141	11	12	12	139	140	140	9	10	10	142	142	142						
7%	14	14	14	139	140	140	13	13	12	142	141	142	12	12	12	140	140	140	10	10	10	143	142	143						
8%	14	15	14	139	140	140	13	13	12	142	141	142	12	12	12	140	141	140	10	10	10	143	143	144						
9%	14	15	14	139	140	140	13	13	12	142	142	143	12	13	12	140	141	141	10	10	11	144	143	144						
10%	15	15	14	140	140	140	13	13	13	143	142	143	13	13	13	140	141	141	10	11	11	144	144	144						
11%	15	15	15	140	140	140	14	14	13	143	143	144	13	13	13	140	142	141	11	11	11	145	145	145						
12%	15	15	15	140	140	140	14	14	13	144	143	144	13	13	13	141	142	141	11	11	11	145	145	145						
13%	15	15	15	140	141	141	14	14	13	144	144	144	13	13	13	141	142	141	11	11	12	146	146	146						
14%	15	15	15	141	141	141	14	14	14	144	144	144	13	13	14	141	142	142	11	12	12	146	147	146						
15%	15	15	15	141	141	141	15	15	14	145	144	145	14	13	14	141	142	142	12	12	12	146	147	146						
16%	15	15	15	141	141	141	15	15	14	145	145	145	14	14	14	141	142	142	12	12	12	146	147	147						
17%	15	15	15	141	142	142	15	15	14	145	145	145	14	14	14	142	143	142	12	13	13	147	148	147						
18%	15	15	15	141	142	142	15	15	14	145	145	145	14	14	14	142	143	142	12	13	13	147	148	148						
19%	15	15	15	142	142	142	15	15	14	145	145	145	14	14	14	142	143	142	12	13	13	147	149	148						
20%	15	15	15	142	142	142	15	15	14	145	145	146	14	14	14	142	143	143	13	13	13	148	149	148						
21%	15	16	15	142	142	142	16	15	15	146	146	146	14	14	14	142	143	143	13	13	14	148	149	149						
22%	15	16	15	142	142	142	16	15	15	146	146	147	14	14	15	142	143	143	13	14	14	148	150	149						
23%	16	16	15	142	142	143	16	16	15	146	146	147	15	15	15	142	143	143	13	14	14	149	150	149						
24%	16	16	15	142	143	143	16	16	15	147	147	147	15	15	15	142	143	143	13	14	14	149	150	149						
25%	16	16	15	143	143	143	16	16	16	147	147	147	15	15	15	143	144	143	14	14	14	149	150	150						
26%	16	16	16	143	143	143	17	16	16	147	147	147	15	15	15	143	144	144	14	14	14	150	150	150						
27%	16	16	16	143	143	143	17	16	16	147	147	148	15	16	15	143	144	144	14	14	14	150	151	150						
28%	16	16	16	143	143	144	17	16	16	147	147	148	15	16	16	143	144	144	14	15	15	150	151	151						
29%	16	16	16	143	144	144	17	17	16	147	148	148	16	16	16	143	144	144	15	15	15	150	151	151						
30%	16	16	16	143	144	144	17	17	17	147	148	148	16	16	16	143	145	144	15	15	15	151	151	151						
31%	16	16	16	143	144	144	17	17	17	148	148	148	16	16	16	143	145	144	15	15	15	151	151	151						
32%	16	16	16	144	144	144	18	17	17	148	148	148	16	16	17	144	145	144	15	15	15	151	151	151						
33%	16	16	16	144	144	144	18	17	17	148	148	149	16	16	17	144	145	144	15	15	15	151	151	151						
34%	16	16	16	144	144	145	18	18	17	148	148	149	17	16	17	144	145	145	15	15	15	151	152	152						
35%	16	16	16	144	144	145	18	18	18	148	149	149	17	16	17	144	145	145	15	16	16	152	152	152						
36%	16	16	16	144	144	145	18	18	18	148	149	149	17	17	17	144	146	145	15	16	16	152	152	152						
37%	16	16	16	144	145	145	18	18	18	148	149	149	17	17	17	144	146	146	16	16	16	152	152	152						

Percentile	N		A		P		D		Math/Algebra II					Science/Biology					Reading/U.S. History					English/English 10						
	ACT			EOC			ACT			EOC			ACT			EOC			ACT			EOC			ACT			EOC		
	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15
38%	16	17	16	144	145	145	19	18	18	149	149	150	17	17	18	145	146	146	16	16	16	152	152	153						
39%	16	17	16	145	145	145	19	19	18	149	149	150	17	17	18	145	146	146	16	17	16	153	152	153						
40%	16	17	16	145	145	145	19	19	18	149	149	150	17	17	18	145	146	146	16	17	17	153	153	153						
41%	17	17	16	145	145	145	19	19	18	150	150	150	17	18	18	145	146	146	16	17	17	153	153	153						
42%	17	17	16	145	145	145	19	19	18	150	150	151	17	18	18	145	147	147	17	17	17	153	153	153						
43%	17	17	16	145	145	145	19	19	18	150	150	151	17	18	18	146	147	147	17	17	17	153	153	154						
44%	17	17	17	145	145	145	19	19	19	150	150	151	17	18	18	146	147	147	17	18	18	154	154	154						
45%	17	17	17	145	145	145	19	19	19	150	150	151	18	18	18	146	147	147	17	18	18	154	154	154						
46%	17	17	17	146	146	146	19	19	19	150	151	151	18	18	18	146	147	147	18	18	18	154	154	154						
47%	17	17	17	146	146	146	19	19	19	150	151	151	18	18	19	146	147	147	18	18	18	154	154	154						
48%	17	17	17	146	146	146	19	19	19	151	151	152	18	18	19	146	148	147	18	18	18	154	154	154						
49%	17	18	17	146	146	146	19	20	19	151	151	152	18	19	19	147	148	147	18	18	19	154	155	155						
50%	17	18	17	146	146	146	20	20	20	151	151	152	19	19	19	147	148	147	18	19	19	155	155	155						
51%	18	18	17	146	146	147	20	20	20	151	151	152	19	19	19	147	148	148	19	19	19	155	155	155						
52%	18	18	17	146	146	147	20	20	20	151	152	152	19	19	19	147	148	148	19	19	19	155	155	155						
53%	18	18	17	146	146	147	20	20	20	151	152	152	19	20	20	147	148	148	19	19	19	155	155	155						
54%	18	18	18	146	147	147	20	20	20	151	152	153	19	20	20	147	149	148	19	19	20	155	155	155						
55%	18	18	18	146	147	147	20	20	20	152	152	153	19	20	20	148	149	148	19	20	20	155	156	156						
56%	18	18	18	146	147	147	20	21	20	152	152	153	20	20	20	148	149	148	19	20	20	156	156	156						
57%	18	19	18	146	147	147	20	21	20	152	153	153	20	20	20	148	149	149	20	20	20	156	156	156						
58%	18	19	18	146	147	147	20	21	20	152	153	153	20	20	21	148	149	149	20	20	20	156	156	156						
59%	18	19	18	147	147	147	20	21	20	152	153	153	20	20	21	148	149	149	20	20	20	156	156	156						
60%	19	19	18	147	147	147	21	21	21	152	154	154	21	20	21	149	149	149	20	20	21	156	156	156						
61%	19	19	18	147	147	148	21	21	21	153	154	154	21	21	21	149	149	149	20	21	21	156	157	156						
62%	19	19	19	147	148	148	21	21	21	153	154	154	21	21	21	149	149	149	20	21	21	157	157	156						
63%	19	20	19	147	148	148	21	21	21	153	154	155	21	21	21	149	150	149	21	21	21	157	157	157						
64%	19	20	19	147	148	148	21	21	21	154	154	155	21	21	21	149	150	149	21	21	21	157	157	157						
65%	19	20	20	148	148	148	21	21	22	154	155	155	21	21	21	149	150	149	21	21	21	157	157	157						
66%	20	21	20	148	148	148	21	22	22	154	155	155	21	21	22	150	150	149	21	21	21	157	157	157						
67%	20	21	20	148	148	148	21	22	22	154	155	155	21	22	22	150	150	150	21	21	21	157	158	157						
68%	20	21	20	148	148	148	21	22	22	154	155	155	21	22	22	150	150	150	21	21	22	157	158	158						
69%	21	21	20	148	149	148	22	22	22	154	155	156	22	22	22	150	150	150	22	22	22	158	158	158						
70%	21	21	21	149	149	149	22	22	22	155	156	156	22	22	23	150	150	150	22	22	22	158	158	158						
71%	21	21	21	149	149	149	22	22	22	155	156	156	22	22	23	150	151	150	22	22	22	158	158	158						
72%	21	22	21	149	149	149	22	23	22	155	156	156	22	22	23	150	151	150	22	22	22	158	158	158						
73%	21	22	22	149	149	149	22	23	22	155	156	156	23	22	23	150	151	151	22	22	23	158	159	158						
74%	22	22	22	149	149	149	22	23	23	155	156	157	23	23	23	151	151	151	22	23	23	158	159	159						
75%	22	23	22	149	150	149	22	23	23	156	157	157	23	23	23	151	151	151	23	23	23	159	159	159						
76%	22	23	22	149	150	149	23	23	23	156	157	157	23	23	23	151	151	151	23	23	23	159	159	159						

	N			A			P			D														
Percentile	Math/Algebra II						Science/Biology						Reading/U.S. History						English/English 10					
	ACT			EOC			ACT			EOC			ACT			EOC			ACT			EOC		
	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15	13	14	15
77%	22	23	23	149	150	150	23	23	23	156	157	158	24	24	23	151	151	151	23	23	24	159	159	159
78%	23	23	23	150	150	150	23	23	24	157	157	158	24	24	24	152	152	152	23	23	24	159	159	159
79%	23	23	23	150	150	150	23	23	24	157	157	158	24	24	24	152	152	152	23	24	24	159	159	159
80%	23	23	23	150	151	150	23	23	24	157	158	158	24	24	24	152	152	152	24	24	24	159	160	160
81%	23	23	24	150	151	150	23	24	24	157	158	159	25	24	25	153	152	153	24	24	24	160	160	160
82%	23	24	24	150	151	151	23	24	24	158	158	159	25	25	25	153	152	153	24	24	25	160	160	160
83%	23	24	24	150	151	151	24	24	24	158	158	159	25	25	25	153	153	153	24	24	25	160	161	160
84%	24	24	24	151	151	151	24	24	24	159	159	159	26	25	26	153	153	153	24	25	25	160	161	160
85%	24	24	24	151	151	151	24	25	25	159	159	159	26	26	26	154	153	153	25	25	25	160	161	161
86%	24	25	24	151	151	151	24	25	25	159	159	159	27	26	27	154	153	154	25	25	26	160	162	161
87%	25	25	25	151	152	152	24	25	25	159	159	160	27	27	27	154	153	154	25	26	26	161	162	161
88%	25	25	25	151	152	152	25	25	25	160	159	160	27	27	27	154	153	154	26	26	26	161	162	162
89%	25	25	25	152	152	152	25	25	25	160	160	160	28	28	28	154	154	154	26	26	27	161	162	162
90%	25	26	26	152	153	152	25	25	26	160	160	160	28	28	28	155	154	155	26	27	28	162	162	162
91%	26	26	26	152	153	152	26	26	26	160	160	160	29	29	29	155	154	155	27	28	28	162	162	162
92%	26	26	26	153	153	153	26	26	26	161	160	161	29	29	29	155	155	155	28	28	29	162	163	163
93%	27	27	27	153	153	153	26	27	27	161	161	161	30	30	30	156	155	155	28	28	30	163	163	163
94%	27	27	27	153	154	153	27	27	27	161	161	161	30	30	31	156	155	156	29	29	30	163	163	164
95%	27	28	28	154	154	154	27	28	27	162	161	162	30	31	31	157	156	156	29	30	30	164	164	164
96%	28	28	28	155	155	154	28	28	28	162	162	162	31	32	32	158	157	157	30	31	32	164	164	165
97%	28	29	29	155	156	155	28	29	30	164	162	163	32	32	32	158	157	158	31	32	33	165	165	165
98%	30	30	30	156	158	155	30	30	31	164	163	164	33	33	33	159	159	158	32	33	34	166	165	166
99%	32	32	32	159	160	158	31	32	33	165	165	165	34	34	34	161	160	160	34	34	34	167	167	167
100%	36	36	36	169	175	175	36	36	36	175	175	175	36	36	36	175	175	175	36	36	36	175	175	175
n	40281	40347	41780	43474	43888	44863	40271	40342	41771	45577	46072	46292	40276	40348	41776	42452	43113	44972	40281	40351	41786	46873	47857	48398

Figures 1-12 display the frequency distributions for students' Algebra II, Biology, U.S. History, and English 10 EOC scores across 2013, 2014, and 2015. By examining the histograms for the previous three years, we can observe any changes in students' EOC performance. Histograms display any outliers (exceptionally low or high EOC scores), as well as negative- or left-skewed distributions (a smaller number of students with low test scores compared to high test scores) and positive- or right-skewed distributions (a smaller number of students with high test scores compared to low test scores).

The figures demonstrate that there have been only small decreases in the number of students scoring in the Novice category since 2013. These decreases were accompanied by modest increases in the overall proportion of students scoring in the Proficient category. These changes are to be expected as modifications and improvements occur in classroom instruction and

curricula from year to year. Students are also apt to gain more content knowledge as their studies continue, leading to improved test performance.

Each figure also provides the mean EOC score for the corresponding subject being assessed during that specific year. As previously stated, mean EOC scores for Kentucky’s student population have remained very stable since 2013, showing only a small upward trend. Between 2013 and 2015, the set of CPE benchmarks have served as a reliable indicator for determining EOC cut scores for the NAPD proficiency categories. The data provided in Table 9 and displayed in the histograms, collectively, support the stability of the original cut scores for Kentucky’s end-of-course assessments.

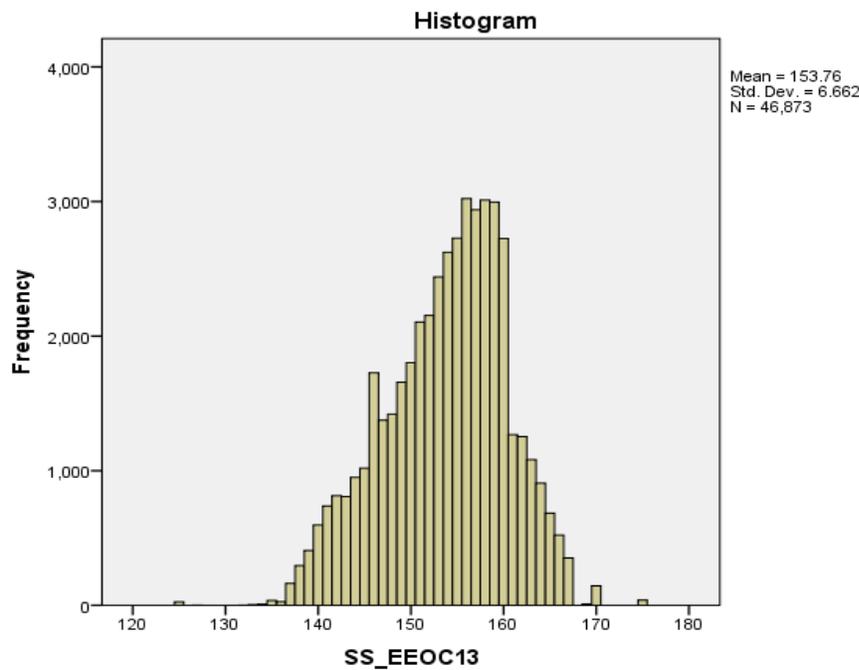


Figure 1. English 10 2013 scale score histogram.

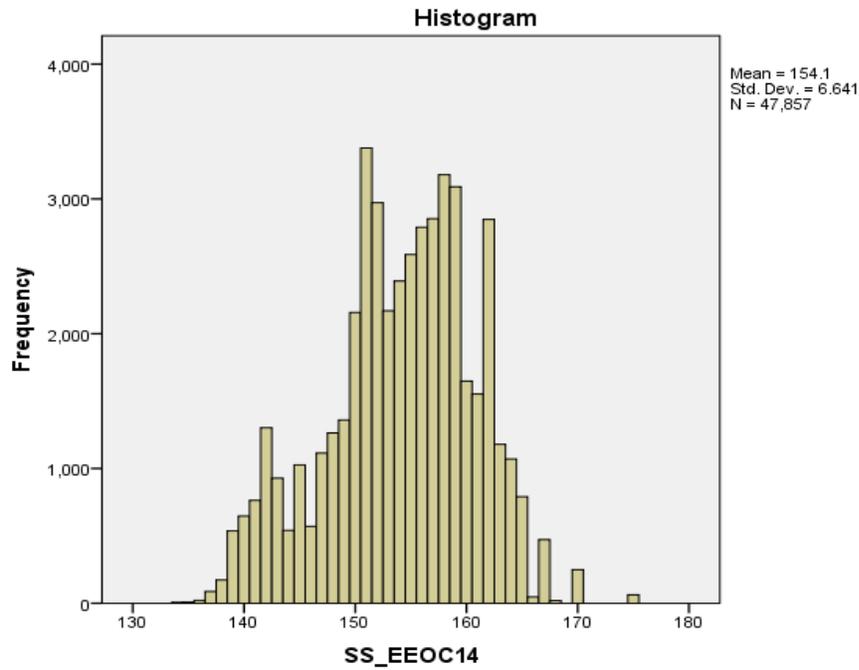


Figure 2. English 10 2014 scale score histogram.

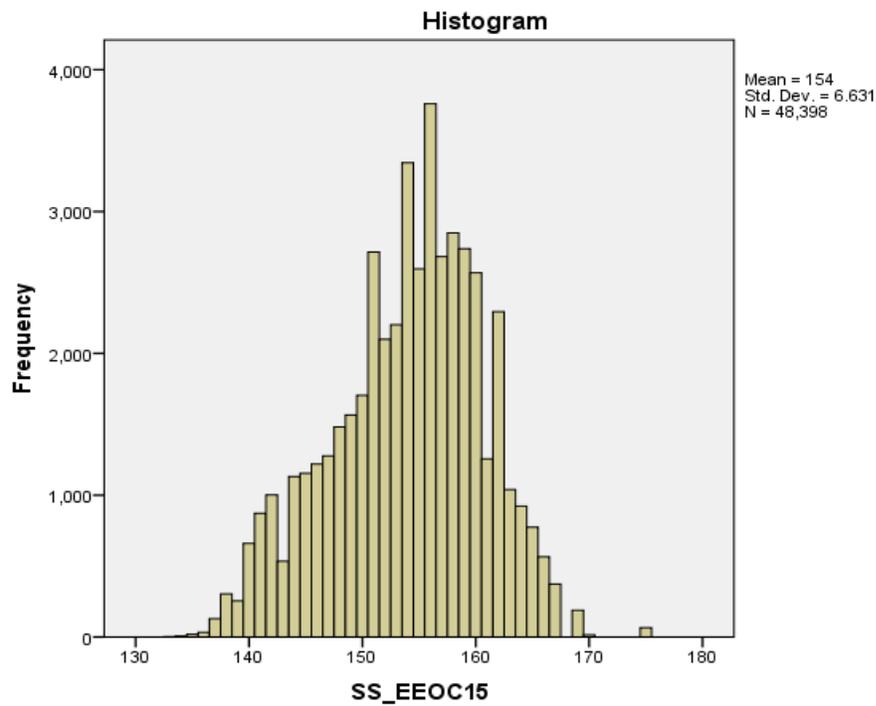


Figure 3. English 10 2015 scale score histogram.

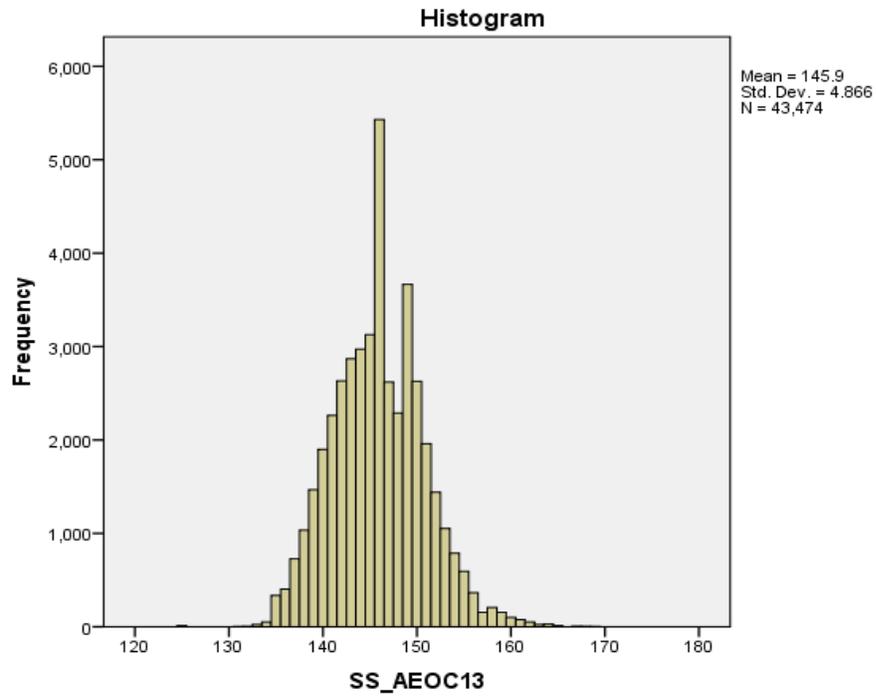


Figure 4. Algebra II 2013 scale score histogram.

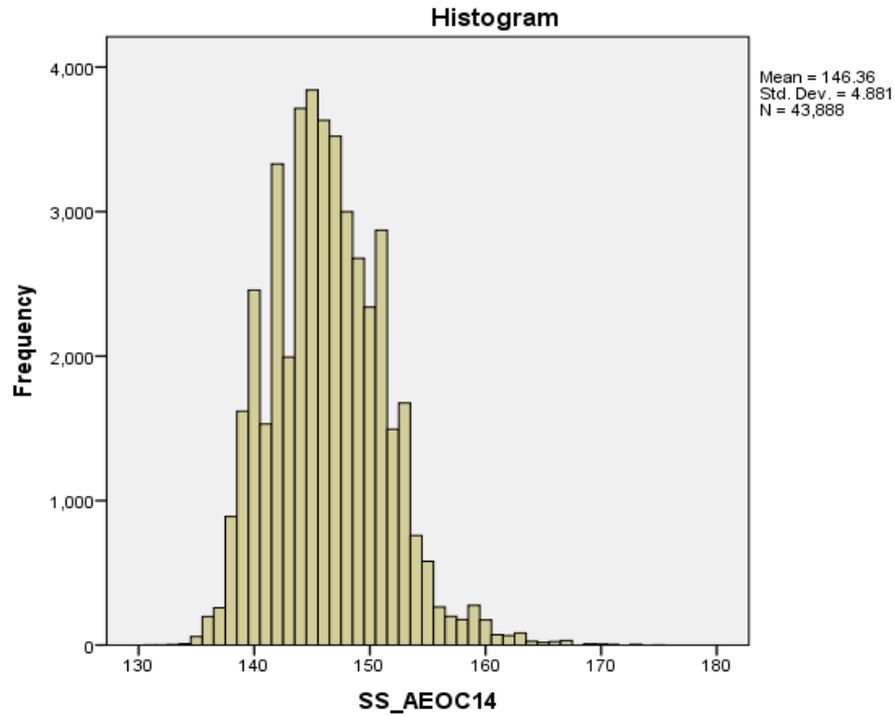


Figure 5. Algebra II 2014 scale score histogram.

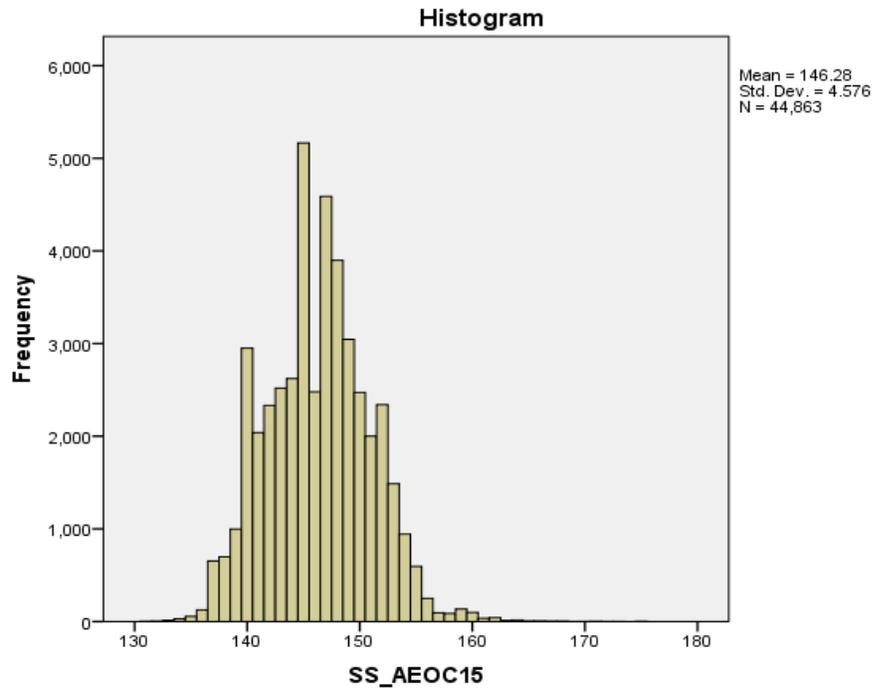


Figure 6. Algebra II 2015 scale score histogram.

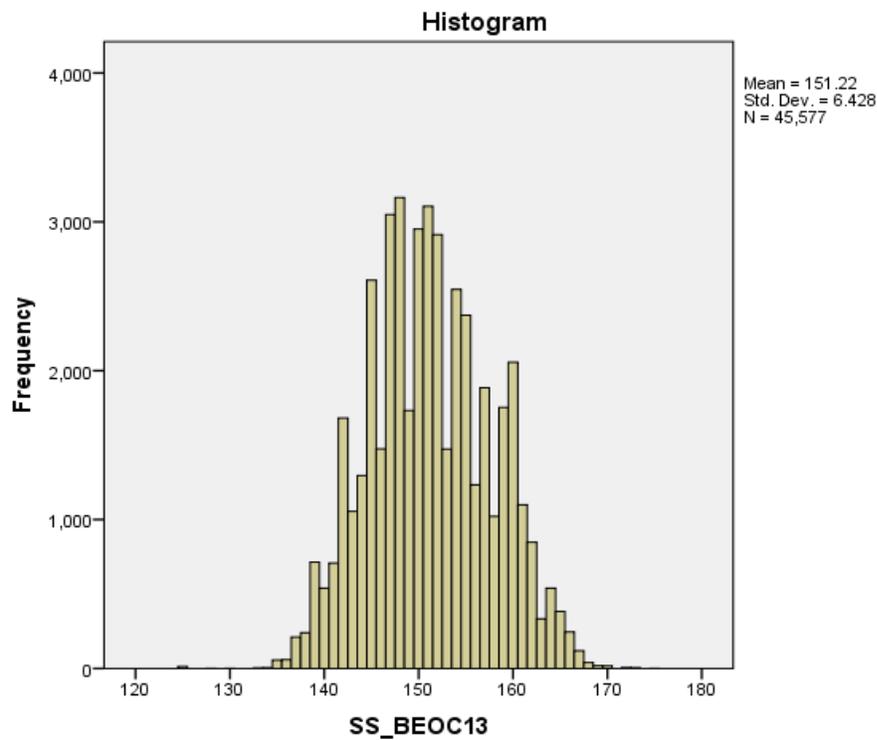


Figure 7. Biology 2013 scale score histogram.

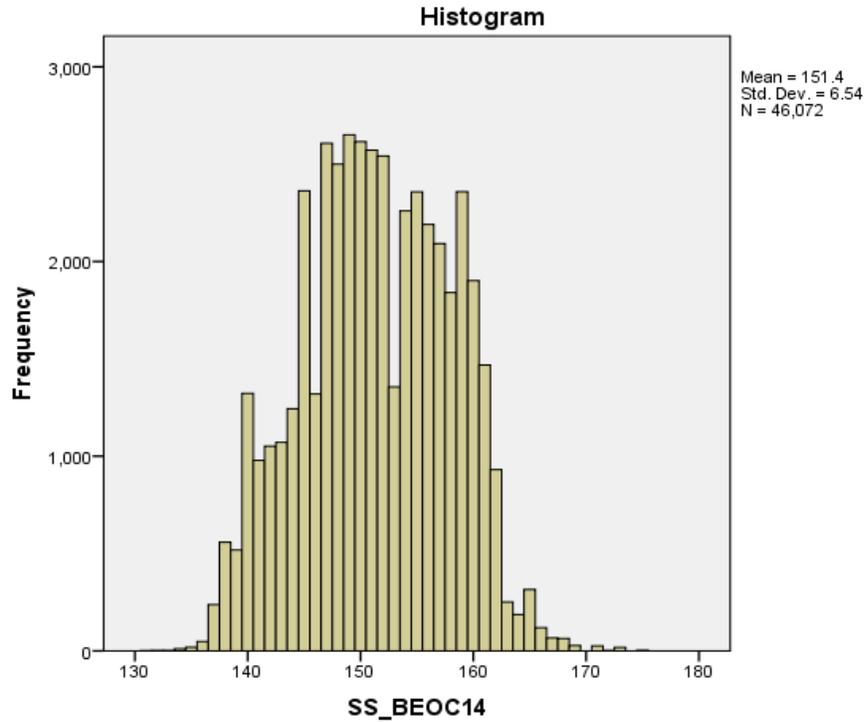


Figure 8. Biology 2014 scale score histogram.

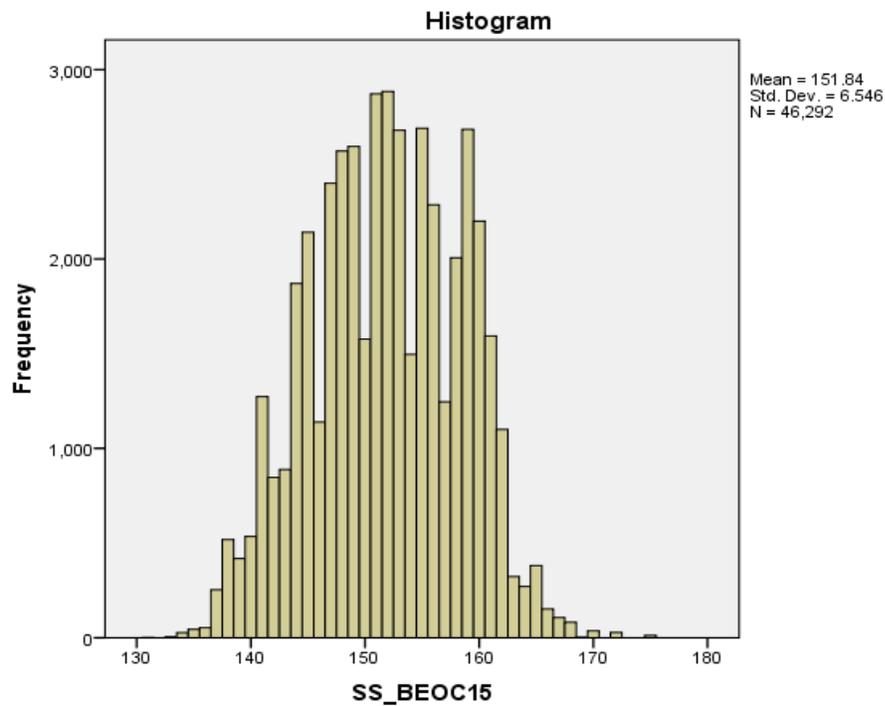


Figure 9. Biology 2015 scale score histogram.

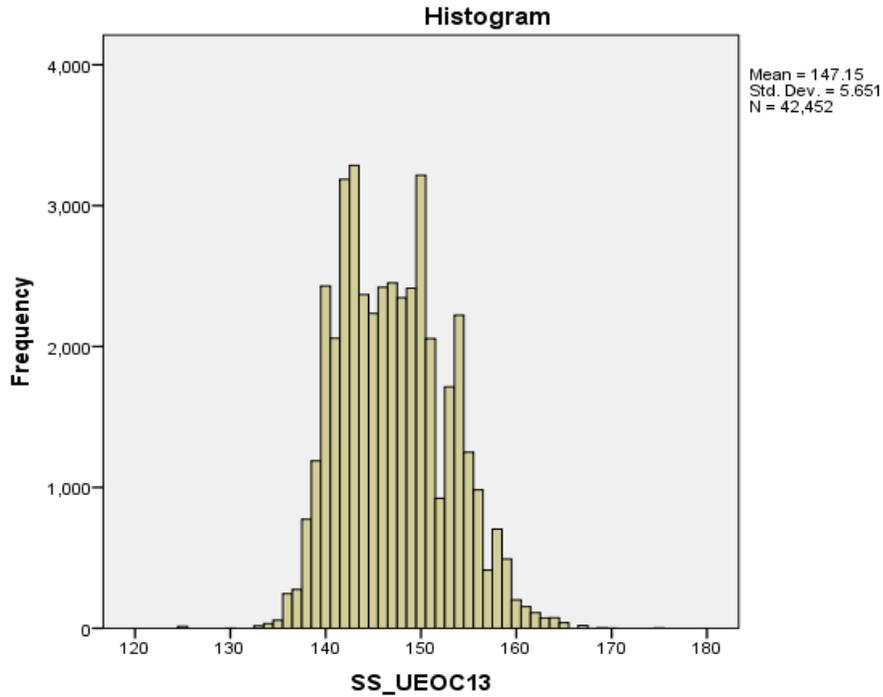


Figure 10. U.S. History 2013 scale score histogram.

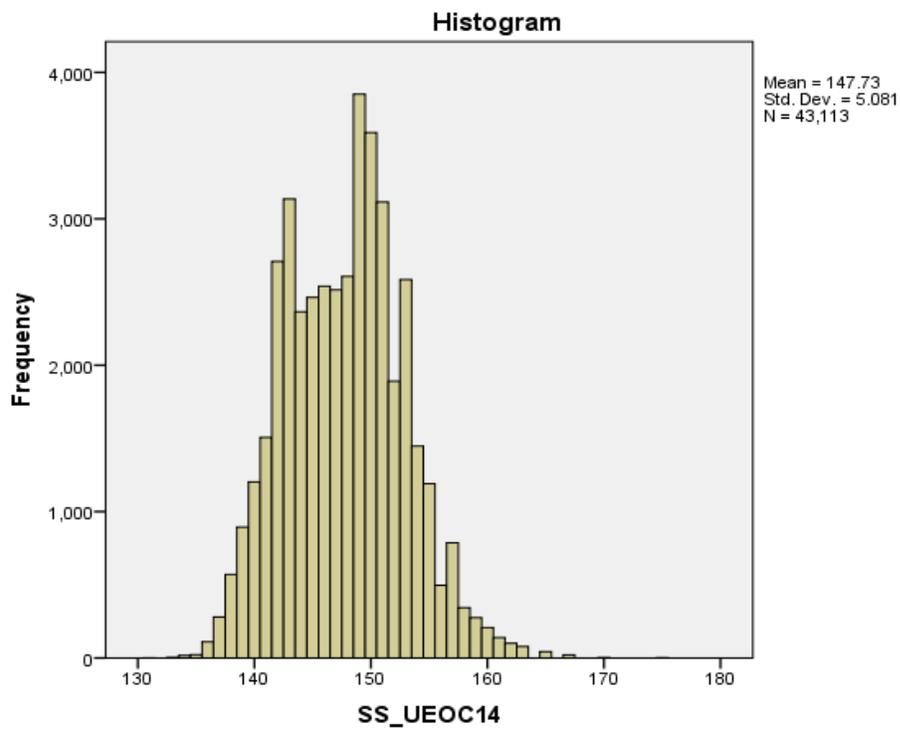


Figure 11. U.S. History 2014 scale score histogram.

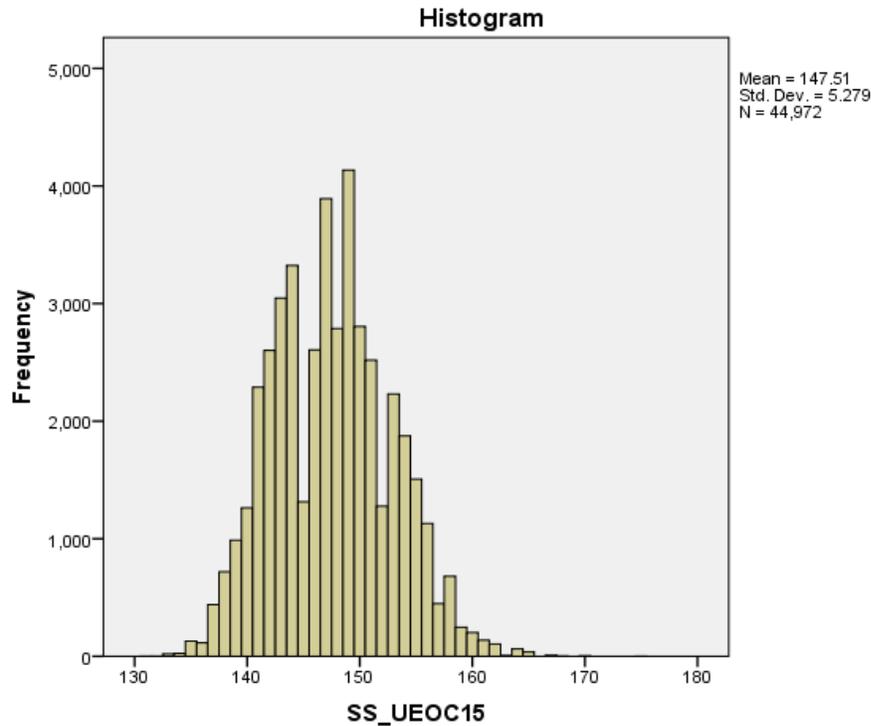


Figure 12. U.S. History 2015 scale score histogram.

Conclusions

Based on the results of the data analyses provided above, HumRRO has determined that classifications for the EOC assessments have remained very stable since they were originally set. The data show that there has been little change in overall student score patterns for either EOC assessments or the ACT assessments to which they were originally linked. This means that interpretations of student proficiency classifications should be relatively unchanged since Kentucky began using EOCs in high school. Overall, these analyses provide positive support for the validity of the interpretations of the EOC scores and classifications.

This study revealed that Kentucky students have shown small, steady improvements on the ACT in all subject areas, however, mean scores have remained more stable on the EOCs. This phenomenon causes some shift in the proportions of students scoring Proficient on the EOCs compared to those scoring at the CPE benchmark on the ACT from 2012 to 2015. The EOC mean scores have remained essentially unchanged, despite small decreases in the proportion of students scoring in the Novice category and small increases in the proportions of students scoring in the Proficient category. The variations of the percentages of students by category may reflect the efforts of schools to target particular students. This phenomenon does not alter any interpretations of EOC scores based on NAPD categories.

HumRRO would advise the Kentucky Department of Education to continue the use of the EOC cut scores for assigning NAPD proficiency categories. Based on 2013-2015 trends, little change would be expected in Kentucky students' EOC scores in the near-term following years. Accordingly, the current NAPD categories should continue to serve as reliable indicators for students' end-of-course assessment performance and as an indicator of college readiness.

References

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