

## **University of Missouri – Kansas City**

### **Using the ETS® Proficiency Profile to Assess General Education Learning Outcomes: Findings for the 2014-15 Administration and Five-Year Trend and Comparative Data**

**Ruth E. Cain, Ed.D, Director of Assessment**

**September 2015**

The University of Missouri – Kansas City administers the ETS® Proficiency Profile each year to undergraduate degree-seeking students as part of the university's assessment of students' achievement of the university's general education learning outcomes. The ETS® Proficiency Profile (EPP) is a nationally-normed, multiple-choice test designed to assess students' abilities in four areas: mathematics, reading, writing, and critical thinking. These learning outcomes are tested within the context of the humanities, social sciences, and natural sciences, although the exam does not measure specific content in these areas, as all needed information is contained in the questions.

In addition to their role in assessing the general education outcomes, the results of the EPP are reported annually to the Missouri Department of Higher Education, as required by State statute and the policies of the Coordinating Board of Higher Education. The results are also made available on the university's College Portrait site, as required for UMKC's participation in the Voluntary System of Accountability.

Together with other direct assessment of student achievement of the general education outcomes, including faculty evaluation of student artifacts from Focus, Anchor, and Discourse courses, and indirect assessments including items on the National Survey of Student Engagement (NSSE) and UMKC's Senior Survey, results from the EPP are used to assess student achievement of the General Education Core learning outcomes. This report presents the results from the 2014-15 administration of the EPP at UMKC. It also presents annual result over five-years for UMKC students, as well as five-year aggregate results for UMKC students and for students at a comparative sample of 10 institutions.

#### **Limitations**

While UMKC introduced a revised General Education Core curriculum in 2013, the students who sat for the EPP in 2014-15, and those represented in the five-year trend analyses included in this report, entered the university under the previous general education program. Therefore, while the results should not be used to evaluate the effectiveness of the 2013 General Education Core, they may serve as valuable indicators of those outcomes for which the university should ensure that it is supporting student achievement, particularly when used in conjunction with direct assessment of student achievement. These findings may also provide baseline data for evaluating the impact of the General Education Core curriculum on student achievement of the four identified learning outcomes evaluated by the EPP.

Another limitation of the exam is that, while it is a graduation requirement for undergraduate students, it is a “low risk” exam for those students. Although students are informed that their best efforts are required, performance on the exam is not tied to course grades or graduation standing. Therefore, students may not be motivated to perform at their highest ability levels on the exam.

Additional limitations should be noted concerning the comparative data. The ten institutions included in the comparison are those who chose to participate in the EPP. Thus, they may not be representative of all UMKC peer institutions. Additionally, the number of students tested and the sampling methods vary among the institutions. Therefore, it is not known if the students tested at the institutions are representative of all students at the selected institutions.

## **Methods**

UMKC administers the abbreviated form of the EPP, which is appropriate for analyzing group data and identifying aggregate achievement of a senior students of the four abilities. (The standard form, which consists of 108 questions, provides detailed information concerning individual student’s performance and the results are used by some institutions for advising purposes.) The abbreviated form of the EPP consists of three exams that are equally distributed among students. Each exam consists of 36 questions measuring college-level skills in reading, writing, critical thinking, and mathematics and takes 40 minutes to complete. The specific skills measured by the exam include:

Reading questions measure students’ ability to:

- interpret the meaning of key terms;
- recognize the primary purpose of a passage;
- recognize explicitly presented information;
- make appropriate inferences; and
- recognize rhetorical devices.

Writing questions measure students’ ability to:

- recognize the most grammatically correct revision of a clause, sentence or group of sentences;
- organize units of language for coherence and rhetorical effect;
- recognize and reword figurative language; and
- organize elements of writing into larger units of measuring.

Critical Thinking questions measure students’ ability to:

- distinguish between rhetoric and argumentation in a piece of nonfiction prose
- recognize assumptions;
- recognize the best hypothesis to account for information presented;
- infer and interpret a relationship between variables; and
- draw valid conclusions based on information presented.

Mathematics questions measure students' ability to:

- recognize and interpret mathematical terms;
- read and interpret tables and graphs;
- evaluate formulas;
- order and compare large and small numbers;
- interpret ratios, proportions, and percentages;
- read scientific measuring instruments; and
- recognize and use equivalent mathematical formulas or expressions.

With the exception of students who have previously completed a bachelor's degree and students seeking teacher certification and who achieved at specified levels on the C-BASE or Missouri General Education Assessment (MoGEA) instruments, all undergraduate, degree-seeking students must complete the EPP prior to graduation. Student who have completed 70 credit hours are notified by email concerning the purposes of the EPP and their eligibility to sit for the exam. The exam is administered in paper and pencil form several times each semester by UMKC testing services at no charge to the students. Reminder emails are sent to each eligible student periodically through the semesters until the exam is completed. If a student completes coursework and other degree requirements prior to completing the EPP, a hold is placed on the student's account, preventing the issuance of the diploma or copies of the transcript until the exam has been taken. Because of the relatively small number of UMKC students who do not sit for the EPP, it is assumed that the characteristics of the students who take the exam do not differ substantially from all UMKC senior students.

For this report, the results were obtained only for senior students, those who had completed 90 or more credit hours prior to taking the EPP, at UMKC and at the ten peer institution included in the comparative data presented below.

## **Results**

The EPP has two scoring conventions: normed-referenced (scaled) scores and criterion-referenced scores. The scaled scores can be used to compare one group of students to another, such as one cohort of UMKC seniors to different cohort, or to compare a group of UMKC senior students to those at other institutions. The criterion-referenced scores measure the level of proficiency obtained at specific levels on the identified learning outcomes. Results of both the scaled scores and the criterion referenced scores are presented below. First, results for UMKC senior students who sat for the EPP in 2014-15 are presented, followed by a five-year trend analysis for 2010-11 through 2014-15. Second, comparisons between UMKC senior students and those at ten peer institutions for five-year aggregate achievement are presented for both the scaled and criterion-reference scores.

## UMKC Senior Students

During 2014-15, 1,422 UMKC students who had earned 70 or more credit hours completed the EPP. Of these, 1,297 students (91%) had achieved senior status by completing more than 90 semester hours prior to sitting for the exam. The scores of the senior students (those who had complete >90 semester credit hours) are used in this report. Limiting the data analysis to senior students allows for the comparison of results with selected peer institutions later in the report. Table 1 below presents the means and standard deviations for the scaled total scores and skill subscores for the UMKC senior students who sat for the EPP during the 2014-15 academic year. Table 2 below presents the mean scores (M) and standard deviations (SD) for UMKC senior students who completed the EPP from AY 2010-11 through 2014-15 (inclusive). The possible range for the standardized total score was 400 to 500 and the possible range for the standardized skills subscores was 100 to 130. Figures 1 and 2 present the five-year trend data for the total scaled scores and the skill subscores.

The results suggest that over the five year period of 2010-11 through 2014-15, there was little variation in the mean total scaled scores, which varied only 2.17 points between the five-year low of 451.56 (2011-12) and the five-year high of 453.73 (2012-13). T-tests conducted to evaluate differences in total mean scores between annual cohorts did not reveal significant differences in achievement. The five-year aggregate mean for the total scaled score was 452.97. As with the total scaled scores, the results for the skill subscores suggest little variation in student achievement in critical thinking, reading, writing, or mathematics across the five-year period. The five-year averages indicate that UMKC senior students consistently scored lower in critical thinking (M=114.04) than in the other three skills measured, that they scored relatively high in reading (M=120.62), and that the scores for writing (M=115.70) and mathematics (M=115.20) were in the middle ranges.

Table 1

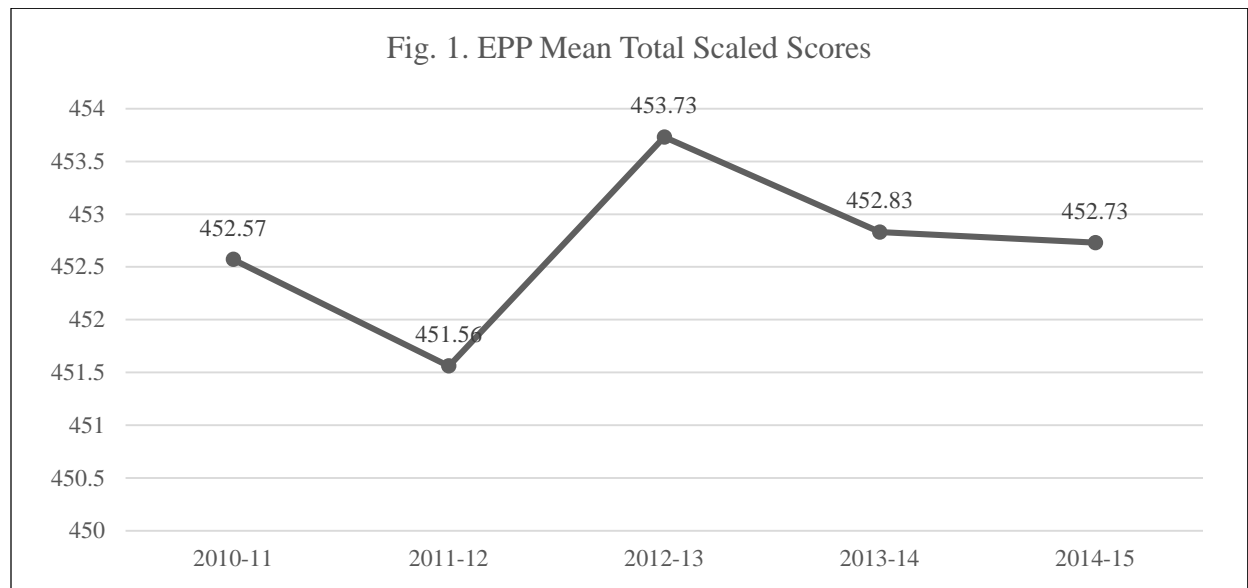
*Scaled Total Scores and Skill Subscores for UMKC Seniors - AY 2014-15 (n=1,297)*

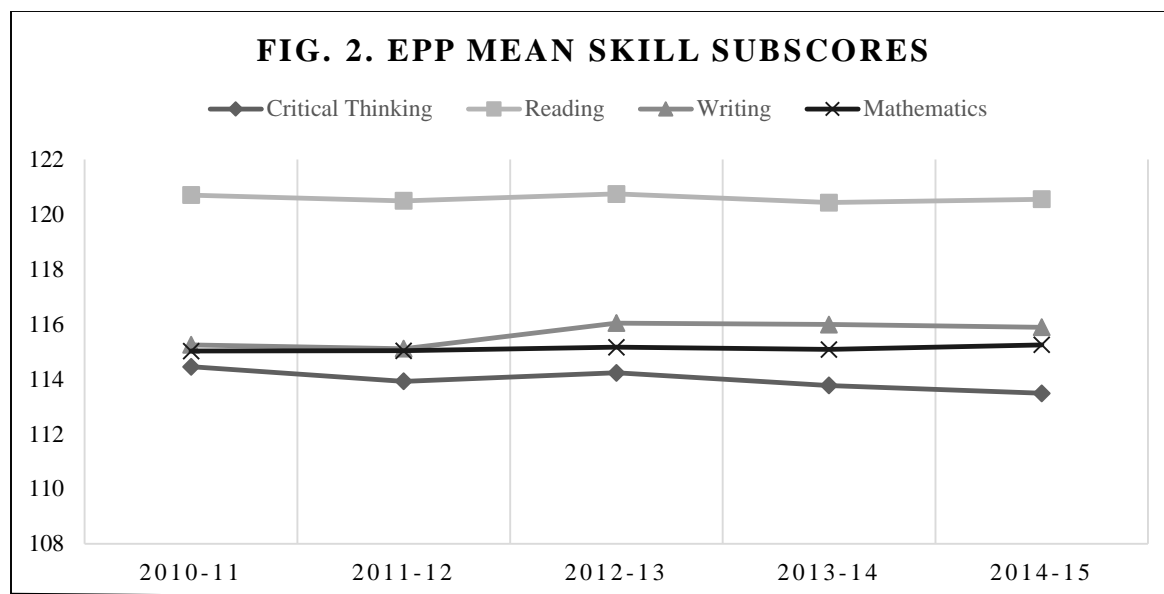
	Possible Range	Mean	SD
Total Score	400 to 500	452.73	19.54
Critical Thinking	100 to 130	113.48	6.32
Reading	100 to 130	120.55	6.82
Writing	100 to 130	115.89	4.89
Mathematics	100 to 130	115.25	6.00

Table 2

*Scaled Total Scores and Skill Subscores for UMKC Seniors AY 2010-11 through AY 2014-15*

	2010-11 N=897		2011-12 N=1,031		2012-13 N=1,395		2013-14 N=1,357		2014-15 N=1,297	
	M	SD	M	SD	M	SD	M	SD	M	SD
Total Score	452.57	19.60	451.56	19.58	453.73	20.14	452.83	19.40	452.73	19.54
Critical Thinking	114.45	6.37	113.92	6.35	114.23	6.55	113.77	6.48	113.48	6.32
Reading	120.70	6.13	120.49	6.14	120.74	6.74	120.43	6.71	120.55	6.82
Writing	115.25	4.50	115.11	4.57	116.04	4.95	115.99	4.76	115.89	4.89
Mathematics	115.02	6.18	115.03	6.29	115.16	6.03	115.08	6.05	115.25	6.00





In addition to the mean total and skill subscores, information provided by ETS® estimates the number of senior students who were proficient, not proficient, or marginal at each identified proficiency level. (Students classified as marginal are those whose test results do not provide enough evidence to classify the student as either proficient or not proficient as does not ascribe any positive or negative value to the classification.) Details from ETS® concerning determinations of proficiency levels for the skills are located in the Appendix.

Table 3 below provides the proficiency classification information for UMKC seniors completing the EPP in 2014-15. Table 4 presents the five-year trend data for the percentage of UMKC seniors classified as proficient. Figure 3 presents the percentage of students classified as proficient in each of the skill levels over five years. As with the scaled scores, the proficiency data indicate a consistent decline in student achievement in critical thinking over the five years, but also reveal declines in proficiency in reading at Level 2 and mathematics at Levels 2 and 3. Conversely, there was a slight increase in the percentage of students classified as proficient in writing at Level 3.

Table 3  
*Criterion-Referenced Scores of UMKC Senior Students - 2014-15*

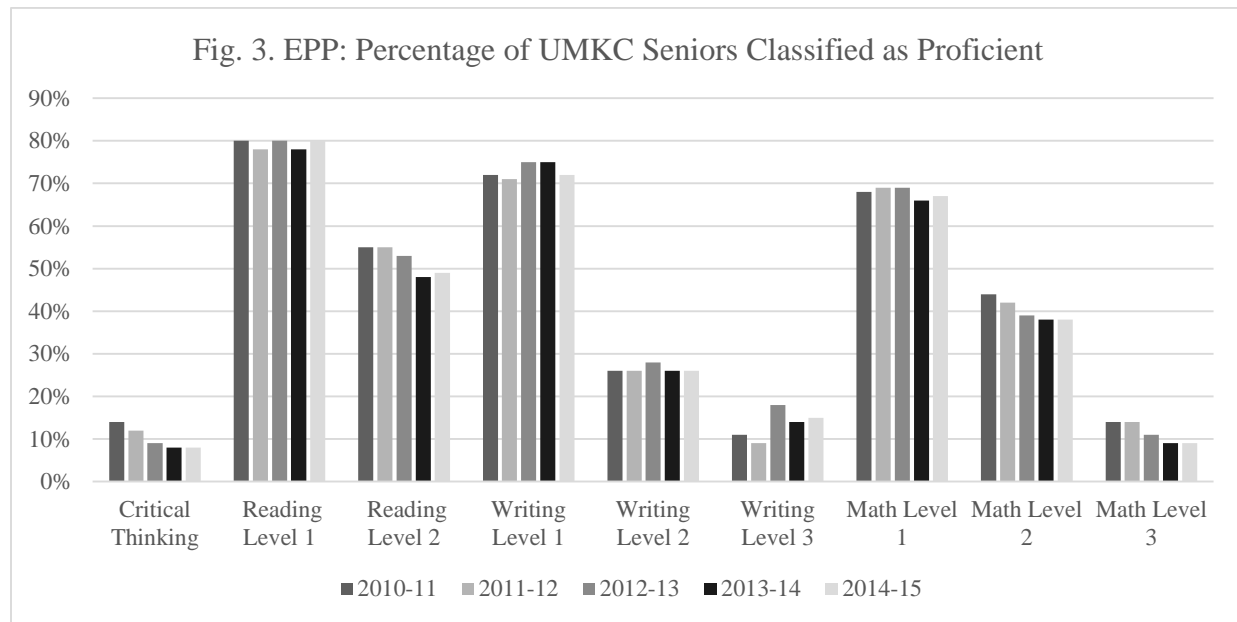
	Proficient	Marginal	Not Proficient
Critical Thinking	8%	27%	66%
Reading, Level 1	80%	10%	10%
Reading, Level 2	49%	23%	28%
Writing, Level 1	72%	23%	5%
Writing, Level 2	26%	40%	34%
Writing, Level 3	15%	27%	58%
Mathematics, Level 1	67%	19%	14%
Mathematics, Level 2	38%	28%	34%

Mathematics, Level 3      9%                      21%                      70%

---

Table 4  
*Percentage of UMKC Seniors Classified as Proficient on EPP Criterion-Referenced Scores – 2010-11 – 2014-15*

	2010-11	2011-12	2012-13	2013-14	2014-15
Critical Thinking	14%	12%	9%	8%	8%
Reading, Level 1	80%	78%	80%	78%	80%
Reading, Level 2	55%	55%	53%	48%	49%
Writing, Level 1	72%	71%	75%	75%	72%
Writing, Level 2	26%	26%	28%	26%	26%
Writing, Level 3	11%	9%	18%	14%	15%
Math, Level 1	68%	69%	69%	66%	67%
Math, Level 2	44%	42%	39%	38%	38%
Math, Level 3	14%	14%	11%	9%	9%



The data indicate that UMKC students’ critical thinking achievement on both the scaled subscores and the criterion-reference scores was lower than that for the other skills assessed over the five years included in this report. Moreover, the data on the percentage of UMKC students classified as proficient indicate a consistent downward trend in achievement of this essential learning outcome over the five years. While a substantial majority of the students included in this report were admitted to UMKC, and completed most or all of the general education

requirements, prior to the introduction of the 2013 General Education Core, the institution should ensure that there are opportunities in both the General Education Core and in major programs of study for students to develop critical thinking abilities.

Comparisons between UMKC Senior Students and Those at Peer Institutions

ETS® provides to institutions the option of identifying a minimum of ten institutions that utilize the EPP for the purpose of obtaining aggregate comparative data. The Doctoral / Research Universities I and II<sup>1</sup> included in the following comparative analysis for senior students who sat for the EPP 2010-2015 are:

- Arizona State University – Tempe,
- Florida International University,
- Temple University,
- The University of Akron<sup>^</sup>,
- University of Alabama at Birmingham<sup>^</sup>,
- University of Cincinnati<sup>^</sup>,
- University of Memphis<sup>^</sup>,
- University of Nevada<sup>^</sup>,
- University of South Florida – Tampa<sup>^</sup>,
- Wayne State University<sup>^</sup>.

As summarized in Table 6, the five-year aggregate scores for UMKC senior students were higher for reading ability than those for senior students at the peer institutions. The possible range for the standardized Total Scaled Score was 400 – 500. The range for the standardized subscores scores for the four skills was 100 – 130. T-tests conducted to evaluate differences in the Reading mean scores, however, did not reveal significant differences in achievement. In contrast, UMKC seniors scored lower than those at the peer institutions on the Total Scaled Score, and on Critical Thinking, Writing, and Mathematics, and t-tests on the means revealed significant differences for these for areas ( $p < 0.001$ ).

Table 6  
*Comparative Scaled Scores for Senior Students at UMKC and Peer-Institutions – 2010-2015*

	UMKC Senior Students N=6,305		Aggregate Peer Senior Students N=5,132	
	Mean	SD	Mean	SD
Total Score*	452.73	19.54	455.30	6.00
Critical Thinking*	113.48	6.32	114.30	1.40
Reading	120.55	6.82	120.30	1.50
Writing*	115.89	4.89	116.20	1.20
Mathematics*	115.25	6.00	117.10	2.00

\* $p < 0.001$

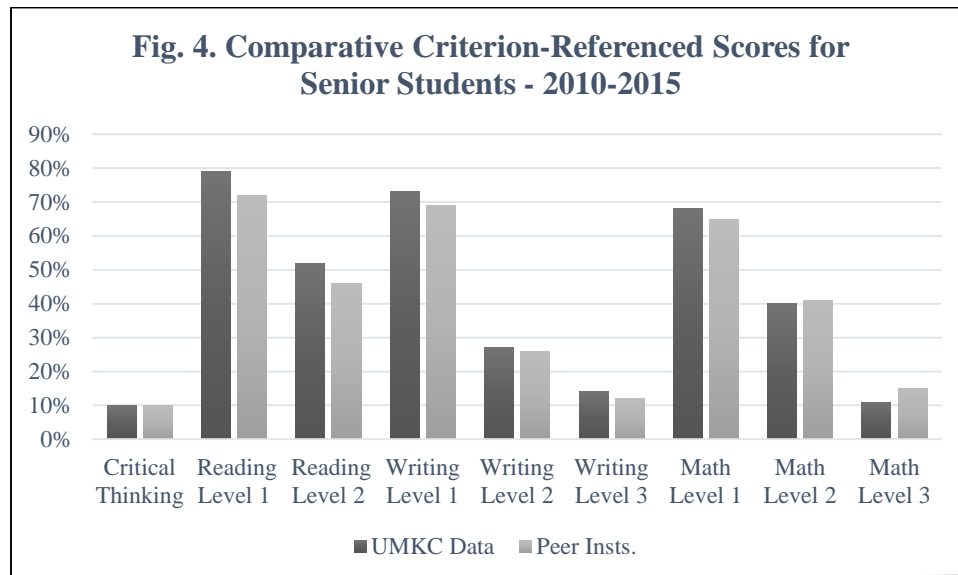
<sup>1</sup> The eight institutions marked with a caret (^) are included in the group of peer institutions identified by UMKC. The additional two institutions were included to bring the total to ten needed for the comparative analysis and were selected because of characteristics including urban location and public research university mission.



A comparison of the results concerning students who are classified in each criterion-referenced Proficiency Classification, Proficient, Marginally Proficient, or Not Proficient, within each level. As indicated in Table 7, a higher percentage of UMKC students was classified as Proficient for both levels of Reading and all three levels of writing than at the comparison institutions. The percentage of UMKC students classified as Proficient in Mathematics was higher for Level 1, but lower for Levels 2 and 3 than at peer institutions. Ten percent of students at both UMKC and the peer institutions were classified as proficient in critical thinking.

Table 7  
*Comparative Criterion-Reference Scores for Senior Students at UMKC and Peer-Institution - 2010-2015*

	UMKC Senior Students N=6,305			Aggregate Peer Senior Students N=5,132		
	Prof	Marg	Not Prof	Prof	Marg	Not Prof
Critical Thinking	10%	26%	64%	10%	23%	67%
Reading Level 1	79%	12%	8%	72%	15%	13%
Reading Level 2	52%	21%	27%	46%	19%	35%
Writing Level 1	73%	21%	6%	69%	23%	7%
Writing Level 2	27%	40%	33%	26%	37%	36%
Writing Level 3	14%	30%	57%	12%	30%	59%
Math Level 1	68%	18%	14%	65%	20%	15%
Math Level 2	40%	27%	33%	41%	25%	35%
Math Level 3	11%	22%	67%	15%	21%	65%



## **Discussion**

The data indicate that UMKC students' achievement on critical thinking on both the scaled subscores and the criterion-reference scores was lower than that for the other skill levels over the five years included in this report. Moreover, the data indicate a consistent downward trend in achievement of this essential learning outcome over the five years. While a substantial majority of the students included in this report were admitted to UMKC and completed most or all of the general education requirements prior to the introduction of the 2013 General Education Core, and while the results for UMKC students are comparable to those of students at the comparative institutions, UMKC should ensure that there are opportunities in both the General Education Core and in major programs of study for student to develop critical thinking abilities. Faculty development opportunities focused on teaching and evaluating critical thinking could contribute to enhancing students' critical thinking abilities.

The General Education Curriculum Committee, faculty teaching general education courses that include learning outcomes that support development of critical thinking, reading, writing, and mathematics abilities, and faculty in major programs that support development of these outcomes should establish thresholds for student achievement and identify and incorporate good practices in supporting student achievement of these outcomes.

In addition to providing indicators of students' current levels of achievement on the EPP, the results presented in this report will provide useful baseline data for evaluating the impact of the 2013 General Education Core and subsequent improvement in supporting student learning on UMKC students' achievement in critical thinking, reading, writing, and mathematics.