Fall 2015 CLA+ Results | Institutional Report

# Southwestern University



cla+

## EXECUTIVE SUMMARY

CLA+ has two primary uses. The first use—helping institutions estimate their contributions to the development of students' higher-order thinking skills—is achieved through growth estimates, as well as overall evidence of students' competency in critical-thinking and written communication. The second use highlights these skills for individual students; CLA+ results provide a valuable tool for potential employers and graduate schools to ascertain the depth of a student's critical-thinking and written-communication skills. With CLA+ Career Connect, those results become accessible and actionable. CLA+ Career Connect gives students a leg up in today's competitive job market, enabling them to: post electronic badges verifying their performance to LinkedIn or other social networking profiles; attend exclusive career fairs with prominent employers; and feature their results on digital credential profiles.

CLA+ results are a powerful tool for assessing students' critical-thinking and written communication skills, measuring growth on these skills, and determining how your institution compares to other colleges and universities using CLA+.

Southwestern University has a freshman Total CLA+ score of 1122; this score is greater than or equal to the average freshman score at 84% of CLA+ schools. A score of 1122 demonstrates Proficient mastery of the critical-thinking and written-communication skills measured by CLA+.

In addition to the information provided here, key metrics contained in this report include Mastery Levels, subscores, growth estimates, and percentile rankings:

### Mastery Levels

CLA+ Mastery Levels allow distinctions in student performance relative to students' proficiency in critical thinking and written communication. These levels contextualize CLA+ scores by interpreting test results in relation to the qualities exhibited by examinees. Each Mastery Level—Below Basic, Basic, Proficient, Accomplished, and Advanced—corresponds to specific evidence of critical-thinking and written-communication skills.

### CLA+ Subscores

In addition to total scores, there are six subscores reported across CLA+. The Performance Task—an essay-based section of the exam—is scored in three skill areas: Analysis and Problem Solving, Writing Effectiveness, and Writing Mechanics. Students receive criterion-referenced subscores for each skill category based on key characteristics of their written responses. Selected-Response Questions are also scored in three areas: Scientific and Quantitative Reasoning, Critical Reading and Evaluation, and Critique an Argument. These subscores are scored based on the number of correct responses that students provide.

### Growth Estimates

The institutional report contains two types of growth estimates: effect sizes and value-added scores.

*Effect sizes* characterize the amount of growth shown across classes, and are reported in standard deviation units. (Standard deviation is a measure of the distance between the mean, or average, and all other values in a score set.) Effect sizes are calculated by subtracting the mean scores of the freshmen from the mean scores of each subsequent class and dividing these amounts by the standard deviation of the freshman scores.

*Value-added scores* provide estimates of growth relative to other CLA+ schools. Specifically, value-added scores—also reported in standard deviation units—indicate the degree to which observed senior mean

CLA+ scores meet, exceed, or fall below expectations as established by two factors: the seniors' entering academic ability (EAA) and the mean CLA+ performance of freshmen at the school, which serves as a control for any selection effects not addressed by EAA.

### Percentile Rankings

Percentile rankings allow for normative interpretations of your students' performance. These rankings are provided for your students' CLA+ scores, as well as for your institutional value-added scores, and indicate how well your institution performed relative to other CLA+ colleges and universities. Percentile rankings indicate the percentage of CLA+ institutions whose scores are equal to or less than your own.

Please see Sections 1–6 for a full set of institutional results.

In addition to your institutional results, your CLA+ institutional report includes a wide variety of information related to the measurement of higher-order thinking skills. Each section and appendix builds on the next to provide you with a full appreciation of how the CLA+ can support the educational mission at your school. The CLA+ institutional report's appendices include information to help you learn about CLA+ measurement, understand relevant statistical concepts, interpret your school's data, examine your performance in relation to performance at other CLA+ schools, and use CLA+ data to enhance student learning at your school.

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## **SECTION 1:** SUMMARY RESULTS, BY CLASS

### Number of Students Tested, by Class

Freshmen: 79 Sophomores: N/A Juniors: N/A Seniors: N/A

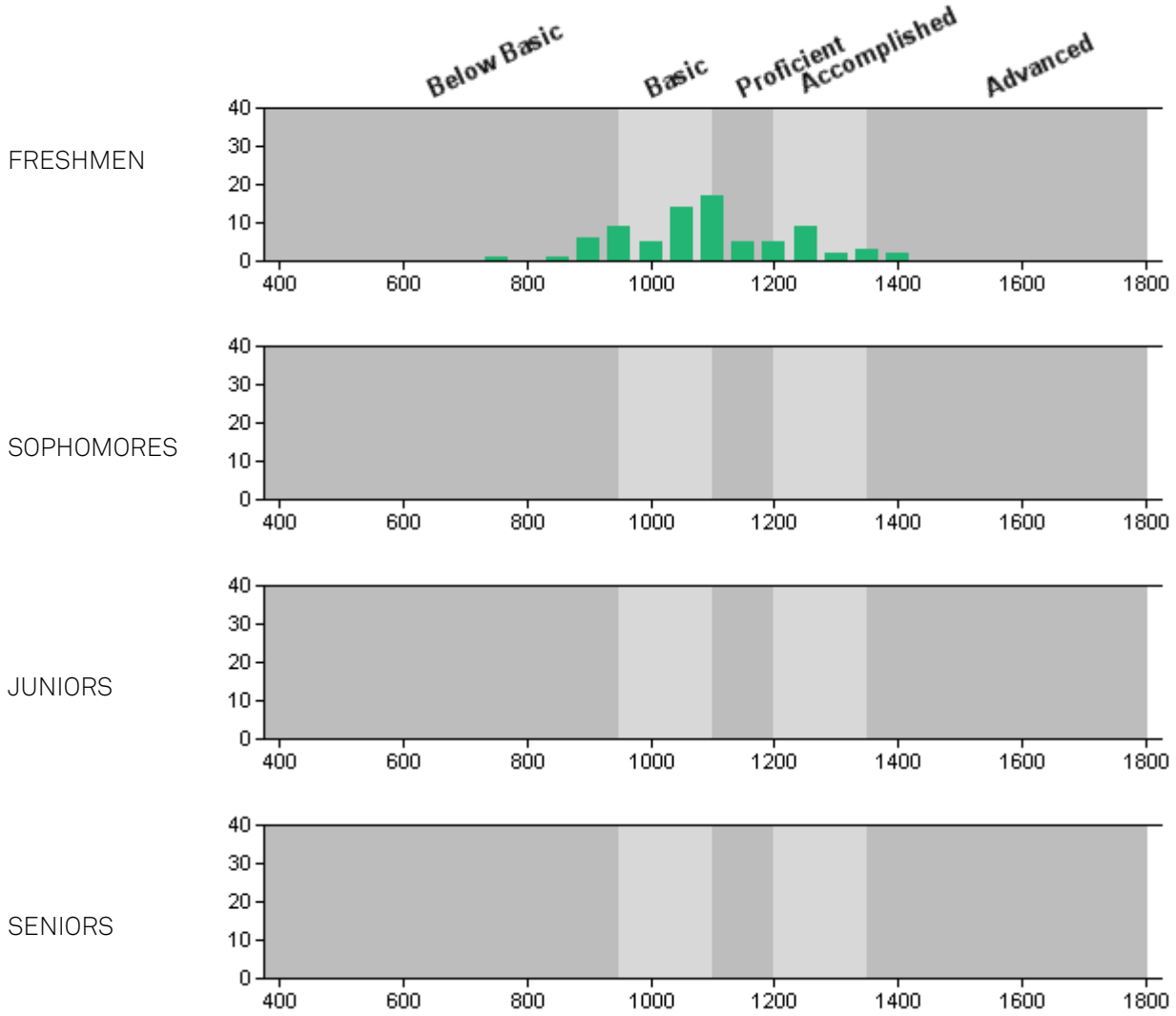
### Summary CLA+ Results, by Class

| | | MEAN SCORE | STANDARD DEVIATION | 25TH PERCENTILE SCORE | 75TH PERCENTILE SCORE | MEAN SCORE PERCENTILE RANK | EFFECT SIZE V. FRESHMEN |
|---|---|---|---|---|---|---|---|
| TOTAL CLA+ SCORE | Freshmen | 1122 | 134 | 1042 | 1225 | 84 | -- |
| | Sophomores | N/A | N/A | N/A | N/A | N/A | N/A |
| | Juniors | N/A | N/A | N/A | N/A | N/A | N/A |
| | Seniors | N/A | N/A | N/A | N/A | N/A | N/A |
| PERFORMANCE TASK | Freshmen | 1077 | 161 | 939 | 1207 | 67 | -- |
| | Sophomores | N/A | N/A | N/A | N/A | N/A | N/A |
| | Juniors | N/A | N/A | N/A | N/A | N/A | N/A |
| | Seniors | N/A | N/A | N/A | N/A | N/A | N/A |
| SELECTED-RESPONSE QUESTIONS | Freshmen | 1167 | 146 | 1061 | 1286 | 94 | -- |
| | Sophomores | N/A | N/A | N/A | N/A | N/A | N/A |
| | Juniors | N/A | N/A | N/A | N/A | N/A | N/A |
| | Seniors | N/A | N/A | N/A | N/A | N/A | N/A |
| ENTERING ACADEMIC ABILITY | Freshmen | 1186 | 137 | 1080 | 1290 | 93 | -- |
| | Sophomores | N/A | N/A | N/A | N/A | N/A | -- |
| | Juniors | N/A | N/A | N/A | N/A | N/A | -- |
| | Seniors | N/A | N/A | N/A | N/A | N/A | -- |

Southwestern University has a senior Total CLA+ score of N/A and percentile rank of N/A. The corresponding Mastery Level for this score is N/A.

## **SECTION 2:** DISTRIBUTION OF MASTERY LEVELS

### Distribution of CLA+ Scores, by Mastery Level




### Mastery Levels, by Class

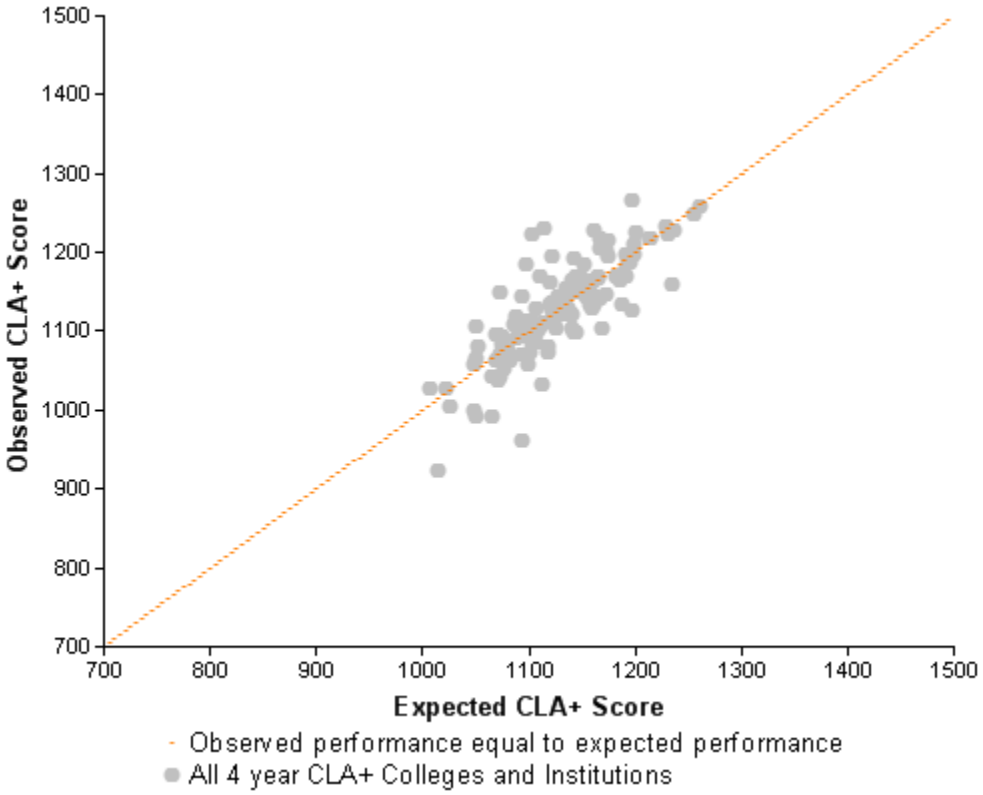
| | MEAN TOTAL CLA+ SCORE | MEAN MASTERY LEVEL | PERCENT BELOW BASIC | PERCENT BASIC | PERCENT PROFICIENT | PERCENT ACCOMPLISHED | PERCENT ADVANCED |
|---|---|---|---|---|---|---|---|
| Freshmen | 1122 | Proficient | 13 | 33 | 29 | 20 | 5 |
| Sophomores | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Juniors | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Seniors | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

## **SECTION 3:** VALUE-ADDED ESTIMATES

| | EXPECTED SENIOR MEAN CLA+ SCORE | ACTUAL SENIOR MEAN CLA+ SCORE |
|---|---|---|
| **Total CLA+ Score** | N/A | N/A |
| Performance Task | N/A | N/A |
| Selected-Response Questions | N/A | N/A |

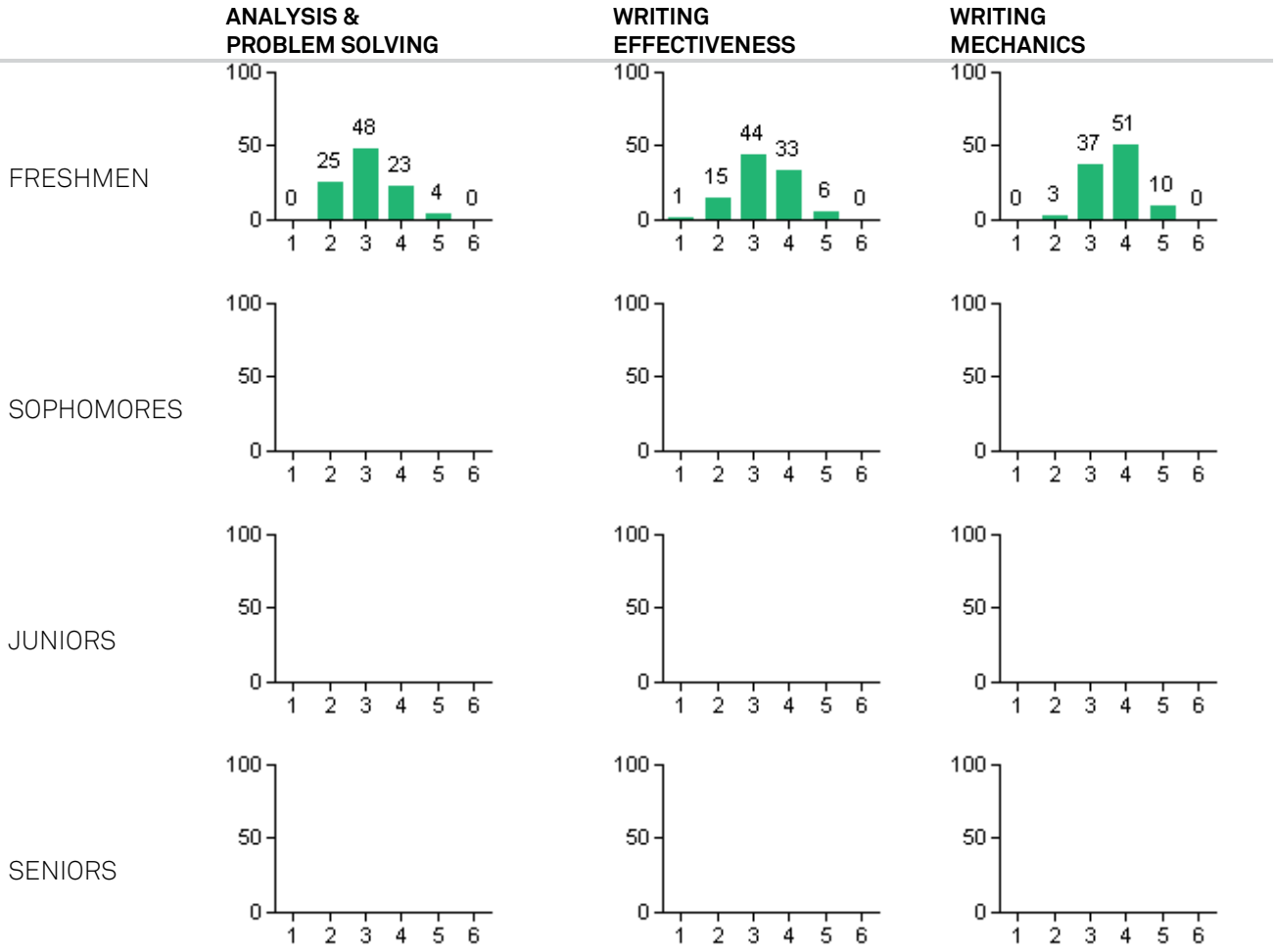
| | VALUE-ADDED SCORE | PERFORMANCE LEVEL | PERCENTILE RANK | CONFIDENCE INTERVAL BOUNDS LOWER | UPPER |
|---|---|---|---|---|---|
| **Total CLA+ Score** | N/A | N/A | N/A | N/A | N/A |
| Performance Task | N/A | N/A | N/A | N/A | N/A |
| Selected-Response Questions | N/A | N/A | N/A | N/A | N/A |

**Expected vs. Observed CLA+ Scores**



## **SECTION 4:** CLA+ SUBSCORES

### Performance Task: Distribution of Subscores (in percentages)




*NOTE: The Performance Task subscore categories are scored on a scale of 1 through 6.*

### Selected-Response Questions: Mean Subscores

| | SCIENTIFIC & QUANTITATIVE REASONING | | | CRITICAL READING & EVALUATION | | | CRITIQUE AN ARGUMENT | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean Score | 25th Percentile Score | 75th Percentile Score | Mean Score | 25th Percentile Score | 75th Percentile Score | Mean Score | 25th Percentile Score | 75th Percentile Score |
| FRESHMEN | 544 | 477 | 619 | 561 | 502 | 640 | 559 | 514 | 611 |
| SOPHOMORES | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| JUNIORS | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| SENIORS | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

*NOTE: The selected-response section subscores are reported on a scale ranging approximately from 200 to 800.*

## **SECTION 5:** STUDENT EFFORT AND ENGAGEMENT

### Student Effort and Engagement Survey Responses

*How much effort did you put into the written-response task/ selected-response questions?*

| | | NO EFFORT AT ALL | A LITTLE EFFORT | A MODERATE AMOUNT OF EFFORT | A LOT OF EFFORT | MY BEST EFFORT |
|---|---|---|---|---|---|---|
| **PERFORMANCE TASK** | Freshmen | 0% | 3% | 35% | 41% | 22% |
| | Sophomores | N/A | N/A | N/A | N/A | N/A |
| | Juniors | N/A | N/A | N/A | N/A | N/A |
| | Seniors | N/A | N/A | N/A | N/A | N/A |
| **SELECTED-RESPONSE QUESTIONS** | Freshmen | 0% | 20% | 38% | 35% | 6% |
| | Sophomores | N/A | N/A | N/A | N/A | N/A |
| | Juniors | N/A | N/A | N/A | N/A | N/A |
| | Seniors | N/A | N/A | N/A | N/A | N/A |

*How engaging did you find the written-response task/ selected-response questions?*

| | | NOT AT ALL ENGAGING | SLIGHTLY ENGAGING | MODERATELY ENGAGING | VERY ENGAGING | EXTREMELY ENGAGING |
|---|---|---|---|---|---|---|
| **PERFORMANCE TASK** | Freshmen | 5% | 16% | 47% | 24% | 8% |
| | Sophomores | N/A | N/A | N/A | N/A | N/A |
| | Juniors | N/A | N/A | N/A | N/A | N/A |
| | Seniors | N/A | N/A | N/A | N/A | N/A |
| **SELECTED-RESPONSE QUESTIONS** | Freshmen | 18% | 30% | 43% | 9% | 0% |
| | Sophomores | N/A | N/A | N/A | N/A | N/A |
| | Juniors | N/A | N/A | N/A | N/A | N/A |
| | Seniors | N/A | N/A | N/A | N/A | N/A |

## **SECTION 6:** STUDENT SAMPLE SUMMARY

### Student Sample Summary

| DEMOGRAPHIC CHARACTERISTIC | | FRESHMEN N | FRESHMEN % | SOPHOMORES N | SOPHOMORES % | JUNIORS N | JUNIORS % | SENIORS N | SENIORS % |
|---|---|---|---|---|---|---|---|---|---|
| **TRANSFER** | Transfer Students | -- | -- | N/A | N/A | N/A | N/A | N/A | N/A |
| | Non-Transfer Students | -- | -- | N/A | N/A | N/A | N/A | N/A | N/A |
| **GENDER** | Male | 33 | 42% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Female | 46 | 58% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Decline to State | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| **PRIMARY LANGUAGE** | English | 72 | 91% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Other | 7 | 9% | N/A | N/A | N/A | N/A | N/A | N/A |
| **FIELD OF STUDY** | Sciences & Engineering | 21 | 27% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Social Sciences | 11 | 14% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Humanities & Languages | 14 | 18% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Business | 12 | 15% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Helping / Services | 8 | 10% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Undecided / Other / N/A | 13 | 16% | N/A | N/A | N/A | N/A | N/A | N/A |
| **FIELD/ ETHNICITY** | American Indian / Alaska Native / Indigenous | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Asian (including Indian subcontinent and Philippines) | 5 | 6% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Native Hawaiian or other Pacific Islander | 0 | 0% | N/A | N/A | N/A | N/A | N/A | N/A |
| | African-American / Black (including African and Caribbean), non-Hispanic | 3 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Hispanic or Latino | 13 | 16% | N/A | N/A | N/A | N/A | N/A | N/A |
| | White (including Middle Eastern), non-Hispanic | 54 | 68% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Other | 2 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Decline to State | 2 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |
| **PARENT EDUCATION** | Less than High School | 3 | 4% | N/A | N/A | N/A | N/A | N/A | N/A |
| | High School | 8 | 10% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Some College | 10 | 13% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Bachelor's Degree | 30 | 38% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Graduate or Post-Graduate Degree | 26 | 33% | N/A | N/A | N/A | N/A | N/A | N/A |
| | Don't Know / N/A | 2 | 3% | N/A | N/A | N/A | N/A | N/A | N/A |

# APPENDIX A: INTRODUCTION TO CLA+

## INTRODUCTION TO CLA+

In 2002, the Collegiate Learning Assessment (CLA) was introduced as a major initiative of the Council for Aid to Education (CAE). Since its launch, the CLA has offered institutions a value-added approach to the measurement of higher-order thinking skills. The carefully designed questions in this examination require students to analyze, evaluate, and synthesize information as they demonstrate their ability to think critically and solve problems. Hundreds of institutions and hundreds of thousands of students have participated in the CLA testing program to date.

Initially, the CLA focused on helping institutions estimate their contributions to the development of students' higher-order thinking skills. As such, the institution rather than the student was the primary unit of analysis. In 2013, CAE expanded this scope with the introduction of CLA+. This enhanced version of the examination provides useful and reliable information about educational growth at the student level as well as the institutional level. Other features new to CLA+ include subscores for scientific and quantitative reasoning, critical reading and evaluation, and critiquing an argument. The addition of mastery levels also supports the reporting of criterion-referenced results in relation to skill proficiency.

CLA+ includes two major components: a Performance Task (PT) and a series of Selected-Response Questions (SRQs).

The **Performance Task** presents students with a real-world situation that requires a purposeful written response. Students are asked to address an issue, propose the solution to a problem, or recommend a course of action to resolve a conflict. They are instructed to support their responses by utilizing information provided in a Document Library. This repository contains a variety of reference materials, such as technical reports, data tables, newspaper articles, office memoranda, and emails. A full PT includes four to nine documents in the library. Students have 60 minutes to complete this constructed-response task.

In the second part of the examination, students are asked to answer 25 **Selected-Response Questions**. Ten questions measure scientific and quantitative reasoning, and ten measure critical reading and evaluation. Another five questions call for students to critique arguments by identifying logical flaws and questionable assumptions. Like the PT, the 25 SRQs are document-based and require students to draw information from provided materials. Students have 30 minutes to complete this section of the assessment.

CLA+ is a powerful assessment tool created to help teachers and students meet their educational objectives. The examination supports programmatic change, particularly in regard to higher-order thinking skills. It shows faculty members, school administrators, and other interested individuals the skill areas requiring attention on an institutional level to strengthen instruction and maximize learning. CLA+ also provides students with direct, formative feedback they can use to evaluate and reflect on their development on a personal level.

Educators may decide to consult their students' CLA+ results when making individualized decisions related to admission, placement, scholarships, or grading. Institutions may also wish to use CLA+ results to provide independent corroboration of competency-based learning, or to recognize students who have exhibited the higher-order thinking skills required for success in twenty-first century careers. Students may choose to share their results with potential employers or graduate schools as well to provide evidence of the skills they have acquired at their college or university. A single test cannot serve as the benchmark for all student learning within higher education, but there are certain skill areas deemed important by most educators across virtually all institutions. The higher-order thinking skills that CLA+ measures fall into this crucial category.

CLA+ allows institutions to benefit from a model of continuous improvement that positions educators as central actors in the relationship between assessment, instruction, and the learning process. Significantly, it provides educators with a frame of reference for determining the status of skill achievement within their institutions as well as the progress their students have made relative to the development of students at other colleges and universities. That said, CLA+ does not rank institutions; rather, it highlights differences between them that can identify opportunities for educational improvements. Similarly, CLA+ does not rank students but instead highlights areas where

individuals excel or may need to focus more effort. CLA+ is an instrument designed to make a meaningful contribution to the improvement of teaching and learning. In this respect, it is in a league of its own.

# APPENDIX B: METHODS

## CLA+ METHODOLOGY

CLA+ uses innovative questions and tasks to evaluate students' higher-order thinking skills. Each test form includes one Performance Task (PT) and 25 Selected-Response Questions (SRQs). The PT section measures three domains: analysis and problem solving, writing effectiveness, and writing mechanics. The SRQ section measures three domains as well: scientific and quantitative reasoning, critical reading and evaluation, and critiquing an argument, which involves the identification of logical flaws and questionable assumptions. Students have 90 minutes to complete the two sections of the assessment—60 minutes for the PT and 30 minutes for the SRQs.

Test results for CLA+ are delivered to institutions after administration windows have closed. Your institutional report presents scoring information for each section of the examination as well as total CLA+ performance for freshmen testing in the fall window and sophomores, juniors, and seniors testing in the spring window. The report includes analyses of the PT score, the SRQ score, and the Total CLA+ score.

PT and SRQ scores indicate the mean, or average, performance of all students who completed each section. PT mean scores are calculated by adding three raw subscores—for analysis and problem solving, writing effectiveness, and writing mechanics—and converting the sum using a common scale. SRQ mean scores are also calculated by adding three raw subscores—for scientific and quantitative reasoning, critical reading and evaluation, and critique an argument—and converting this sum using a common scale. Total CLA+ scores are then calculated by averaging the PT and SRQ mean scores. For more information about the scaling process, please see Appendix J, *Scaling Procedures*.

In addition to mean scores, your report includes 25$^{th}$ and 75$^{th}$ percentile scores, which characterize the score values earned by 25% and 75% of your students, respectively. For example, a 25$^{th}$ percentile score of 974 for the total CLA+ would inform you that 25% of your students earned 974 or less. Similarly, a 75$^{th}$ percentile score of 1096 would let you know that 75% of your students earned 1096 or less. The values that fall between the 25$^{th}$ and 75$^{th}$ percentile scores thus tell you the score values earned by 50% of your students. To extend the previous example, the 25$^{th}$ and 75$^{th}$ percentile scores reported would let you know that 50% of your students earned Total CLA+ scores between 974 and 1096.

Your report may also include percentile rankings of your mean scores. These values let you know the percentage of institutions whose mean scores were lower than yours. Comparative in nature, these statistics are calculated based on the institutions testing within your administration window. Percentile rankings may thus not always be available, as they depend on the characteristics of the institutional sample.

Finally, the institutional report contains two types of growth estimates for the students in your school who took CLA+: effect sizes and value-added scores.

**Effect sizes** characterize the amount of growth evident across classes. They do so by relating the performance of the freshman class to that of the sophomore, junior, and senior classes. Please note that these statistics are available based on your students' participation in CLA+ testing by class. They do not take into account the performance of students at other institutions.

Effect sizes are calculated by subtracting the mean scores of the freshmen from the mean scores of each subsequent class and dividing these amounts by the standard deviation of the freshmen scores. (Standard deviation is a measure of the distance between the mean, or average, and all other values in a score set.) Effect sizes are reported in standard deviation units. By comparing effect sizes, you can gauge student growth over time and begin to analyze patterns of teaching and learning at your institution.

While effect sizes characterize growth from freshman to senior year within an institution, **value-added scores** relate that growth meaningfully to the growth of students across other colleges and universities. A simple comparison of the average achievement at all schools tends to present selective institutions in a favorable light and overlook the educational efficacy of schools admitting students with weaker academic backgrounds. Value-added modeling addresses this situation by providing us with scores comparable to those of institutions with entering students of similar academic ability. It is thus frequently viewed as an equitable way of estimating an institution's contribution to learning

and thus of demonstrating its relative educational efficacy.

To calculate value-added estimations, we employ a statistical technique known as hierarchical linear modeling (HLM). This method yields value-added scores that indicate the degree to which observed senior CLA+ mean scores at an institution meet, exceed, or fall below expectations as established by two factors: the seniors' entering academic ability (EAA) scores and the mean CLA+ performance of freshmen at the school, which serves as a control for any selection effects not addressed by EAA.[1] Only students with EAA scores are included in institutional analyses.

Institutions have high "value-added" scores when the average performance of their seniors is substantially better than expected. For example, consider an instance in which a group of schools admit students with similar average performance on general academic ability tests such as the SAT or ACT—and similar average performance on tests of higher-order thinking skills such as CLA+. After four years, the seniors at one school perform better than usual on CLA+ than the seniors do at other schools in the group. Given the initial similarities in testing performance across these schools, one can reasonably infer in this example that greater gains in critical thinking and writing skills occurred in the highest performing school. Importantly, low value-added scores do not necessarily indicate a lack of improvement between freshman and senior years; however, they do suggest that gains were lower than typically observed at schools testing students with similar EAA.

Value-added scores are placed on a standardized scale and assigned performance levels. These scores are also known as "z-scores" because they relate performance to the mean, or average. The categories for value-added scores are as follows:

- above +2.00: "well above expected,"
- +2.00 to +1.00: "above expected,"
- +1.00 to -1.00: "near expected,"
- -1.00 to -2.00: "below expected," and
- below -2.00: "well below expected."

Value-added scores are also accompanied by confidence intervals, which provide information about the precision of the estimates. Narrow confidence intervals indicate more precision, while wider intervals indicate less precision. Please note that our analyses take the results from all CLA+ institutions into consideration, regardless of sample size or sampling strategy. Therefore, we also encourage you to apply due caution when interpreting your results if you tested a very small sample of students or believe that the students in your institution's sample are not representative of the larger student body.

In the past, value-added models were recalculated after each academic year, which allowed for a potential fluctuation in results due to changes in the sample of participating institutions rather than changes in actual growth within a college or university. The introduction of CLA+ marks the first time that value-added equation parameters will be fixed. This procedure will facilitate reliable year-to-year comparisons of value-added scores for CLA+ institutions.

[1] EAA is determined based on one of three sets of scores: (1) combined SAT Math and Critical Reading, (2) ACT Composite, or (3) Scholastic Level Examination (SLE) scores reported on the SAT Math and Critical Reading scale.

# APPENDIX C: EXPLANATION OF YOUR RESULTS

This appendix provides guidance on interpreting the institutional results presented in sections 1–6 of your report. The sample of students analyzed in each table includes freshmen who tested in the fall window and sophomores, juniors, and seniors who tested in the spring window. To ensure that the results in your report are based on a consistent sample, your students must act as follows:

1. Take CLA+ within the administration window specified for their class level.
2. Complete all sections of the assessment, including the Performance Task, Selected-Response Questions, and the accompanying survey.
3. Have their EAA scores (SAT, ACT, or SLE) submitted to CAE by your institution's registrar.

Please note that students designated for exclusion from analyses by your institution during registrar data submission will not be included in the sample.

The results discussed in this appendix include percentile rankings and value-added scores, which relate performance in your school to performance at other CLA+ colleges and universities. To see cross-institutional summary data, please refer to Appendix D, *Results Across CLA+ Institutions*. For a complete list of all CLA+ institutions, consult Appendix E, *Institutional Sample*.

## **SUMMARY RESULTS, BY CLASS** (Section 1, page 2)

The first table in Section 1 of this report is titled **Number of Students Tested, by Class**. This table specifies the number of freshmen who tested in the fall window and the number of sophomores, juniors, and seniors who tested in the spring window of the academic year. Your sample size is based on these numbers and used when calculating results in all subsequent tables and figures of the report. Please note that very small samples (e.g., fewer than 100 students for any given class) should be interpreted with caution, as smaller sample sizes are less likely to provide reliable or representative results.

The next table, **Summary CLA+ Results, by Class**, presents a statistical overview of the students in your sample. It provides mean scores, quartiles, percentile ranks, and effect sizes for each class level tested. These results pertain to the test as a whole as well as to each section. The table also includes an overview of your students' EAA, or entering academic ability. Please note that any class level not tested, or for which results are not applicable, is designated as "N/A" in this table and others throughout your report.

The Mean Score column lists the average scores for students in your sample. These scores are also considered your institutional CLA+ scores.

The 25th Percentile Score column indicates maximum score values earned by 25% of your students. Said another way, 25% of your students earned these score values or less. Similarly, the 75th Percentile Score column indicates maximum score values earned by 75% of your students. By comparing results in the 25th and 75th columns, you can determine the range in which 50% of your students scored.

Mean Score Percentile Ranks indicate how well your institution performed relative to other CLA+ colleges and universities. The values in this column represent the percentage of institutions whose mean scores were lower than yours. If the sample of schools testing at a corresponding class level is insufficient, "N/A" will appear in the relevant cell of the table.

For a summary of institutional performance at CLA+ colleges and universities, please refer to Appendix D, *Results Across CLA+ Institutions*.

The final column in this table—Effect Size v. Freshmen—presents growth estimates across class levels at your school. Effect sizes relate the performance of freshmen to that of sophomores, juniors, and seniors, allowing you to evaluate student learning outcomes over time. Effect sizes are reported in units of standard deviation established by the performance of freshmen within your school. An effect size of 0 indicates no difference in the performance of entering and exiting students, while positive effect sizes show improved performance, with larger numbers representing increasingly stronger performance.

## **DISTRIBUTION OF MASTERY LEVELS** (Section 2, page 3)

Section 2 of your institutional report focuses on Mastery Levels, which are criterion-referenced indicators of performance new to CLA+. On individual reports, Mastery Levels are determined by students' Total CLA+ scores. On institutional reports, they are determined by each class level's mean Total CLA+ score.

There are five Mastery Levels: Below Basic, Basic, Proficient, Accomplished, and Advanced. Please see Appendix H, *Mastery Levels*, for a detailed description of these categories and the process through which they were derived.

Section 2 includes two tables related to Mastery Levels. The first, **Distribution of CLA+ Scores, by Mastery Level**, contains a histogram of Total CLA+ scores for each class level that you tested, overlaid with Mastery Level cut score points. This chart shows how the distribution of CLA+ scores within your sample corresponds to student mastery of the skills measured by CLA+.

The second table provides a summary of **Mastery Levels, by Class**. The first column of data lists the Mean Total CLA+ score for each class tested, followed by the corresponding Mastery Level—the level at which the average student within your sample performed. The next five columns present the percentage of students that performed at each Mastery Level, by class.

## **VALUE-ADDED ESTIMATES** (Section 3, page 4)

Section 3 of your institutional report uses value-added estimates to relate growth at your institution to growth at other schools. Please note that all tables in this section will read "N/A" when schools test classes other than freshmen and seniors.

The first table provides your students' Expected Senior Mean CLA+ Scores alongside their Actual Senior Mean CLA+ Scores for the total examination as well as each section. Expected scores are determined by the typical performance of seniors at institutions testing similar samples of students. These samples are identified based on senior EAA scores and mean freshman performance on CLA+.

The second table presents value-added results. Your Value-Added Scores are calculated by obtaining the difference between your institution's Actual Senior Mean CLA+ Scores and Expected Senior Mean CLA+ scores. These amounts are then converted to standard deviation units.

Value-added scores for CLA+ and each section of the examination are accompanied by Performance Levels, which are based on the scores as follows:

- above +2.00: "well above expected,"
- +2.00 to +1.00: "above expected,"
- +1.00 to -1.00: "near expected,"
- -1.00 to -2.00: "below expected," and
- below -2.00: "well below expected."

In addition to Performance Levels, each value-added score is assigned a Percentile Rank. This number tells you the percentage of colleges and universities whose value-added scores fall below those of your institution.

Importantly, value-added scores are estimates of unknown quantities, expectations rather than observations. Their evaluation should thus be contextualized by information about the precision of the estimate. The Confidence Intervals which accompany value-added scores in your report provide this type of information. Narrow confidence intervals indicate more precision in the estimate, while wider intervals indicate less precision.

CAE uses hierarchical linear modeling (HLM) to calculate value-added scores, determine their standard errors, and compute 95% confidence intervals unique to each school. Institutions testing larger samples of seniors obtain smaller standard errors and more narrow confidence intervals, which indicate a more precise estimate of value-added scores. Strongly related to senior sample size, standard errors reflect variation in EAA and CLA+ scores within and between institutions. Corresponding confidence intervals represent the range of value-added scores we would anticipate if testing were repeated a number of times with different samples of students. To elaborate, if testing were conducted 100 times with different samples of students, about 95 out of the 100 confidence intervals reported would include your institution's "true" value-added scores. Here, it is critical to understand that confidence levels do not indicate uncertainty in your "true" value-added

scores. They indicate uncertainty in the estimation of these scores as a result of sampling variation.

The final diagram in this section is a scatterplot of **Expected vs. Observed CLA+ Scores**. This graph illustrates the performance of all four-year colleges and universities relative to their expected performance as predicted by the value-added model. The gold diagonal line represents the points at which expected and observed senior scores are equivalent. The vertical distance from the diagonal line indicates the value added by an institution. Institutions above the diagonal line add more value than expected based on the model; institutions below the line add less value than expected. Your institution appears as a red data point in this chart.

For more information about CLA+ value-added methodology, please consult Appendix K, *Modeling Details*. Here, you will find information about model parameters as well as additional guidance on interpreting confidence intervals and instructions for using your data file to calculate value-added estimates for student subgroups.

## **CLA+ SUBSCORES** (Section 4, page 5)

Your report includes Total CLA+ scores as well as scores for the Performance Task (PT) and Selected-Response Questions (SRQs). These section scores based on item type are further divided into subscores based on skill categories. The three subscores for the PT indicate performance in Analysis and Problem Solving, Writing Effectiveness, and Writing Mechanics. The three subscores for the SRQs indicate performance in Scientific and Quantitative Reasoning, Critical Reading and Evaluation, and Critique an Argument, which involves the identification of logical flaws and questionable assumptions.

The first table in Section 4 is **Performance Task: Distribution of Subscores (in percentages).** The charts in this table indicate the distribution of subscores for each of the three skill categories by class level. The charts present the percentage of your students at each score value. Ranging from 1 to 6, each value is associated with a specific set of response characteristics. For more information about the scoring rubric, please see Appendix G, *Scoring CLA+*.

The second table, **Selected-Response Questions: Mean Subscores**, provides summary statistics for the three skill categories measured in the SRQ section. The scores in this CLA+ section are determined by the number of correct responses and adjusted based on item difficulty. Each subscore is reported on a scale of approximately 200 to 800.

Mean Scores in this table reflect the average score received by each class for each of the three skill categories. The 25th Percentile Scores indicate the score values at or below which 25% of your students scored (again, by class level). The 75th Percentile Scores indicate the score values at or below which 75% of your students scored. By comparing results in the 25$^{th}$ and 75$^{th}$ columns, you can determine the range in which 50% of your students scored.

## **STUDENT EFFORT AND ENGAGEMENT** (Section 5, page 6)

CLA+ ends with a set of survey questions, two of which are related to the assessment. One question asks students how much effort they put into completing the Performance Task (PT) and 25 Selected-Response Questions (SRQs). The other question asks students how engaging they found each section of the assessment to be. Students indicate their answers on a likert scale, ranging from "No effort at all" to "My best effort" and "Not at all engaging" to "Extremely engaging." The table in Section 5, **Student Effort and Engagement Survey Responses**, provides the percentage of students who selected each answer option by class level.

The survey questions are designed to help institutions consider the role that effort and engagement may play in student performance on CLA+. Survey results may also be consulted when evaluating the impact that recruitment efforts have on student motivation.

For a distribution of survey responses across all colleges and universities, please see Appendix D, *Results Across CLA+ Institutions*. By comparing your institution's survey results with those of all schools, you can examine the motivation and engagement of your students relative to that of students at other colleges and universities.

## **STUDENT SAMPLE SUMMARY** (Section 6, page 7)

The final section of your institutional report includes a **Student Sample Summary**, which provides the number and percentage of students within your sample who meet various characteristics. These characteristics include: transfer status, gender, primary language, field of study, FIELD or ethnicity, and parent education level. Transfer status is reported by participating institutions during the registrar data collection process. All other demographic characteristics are provided by students as part of the post-assessment survey.

# APPENDIX D: RESULTS ACROSS CLA+ INSTITUTIONS

## SECTION D1: SUMMARY RESULTS, BY CLASS

### Number of Participating Institutions, by Class

Freshmen: 169 Seniors: 155

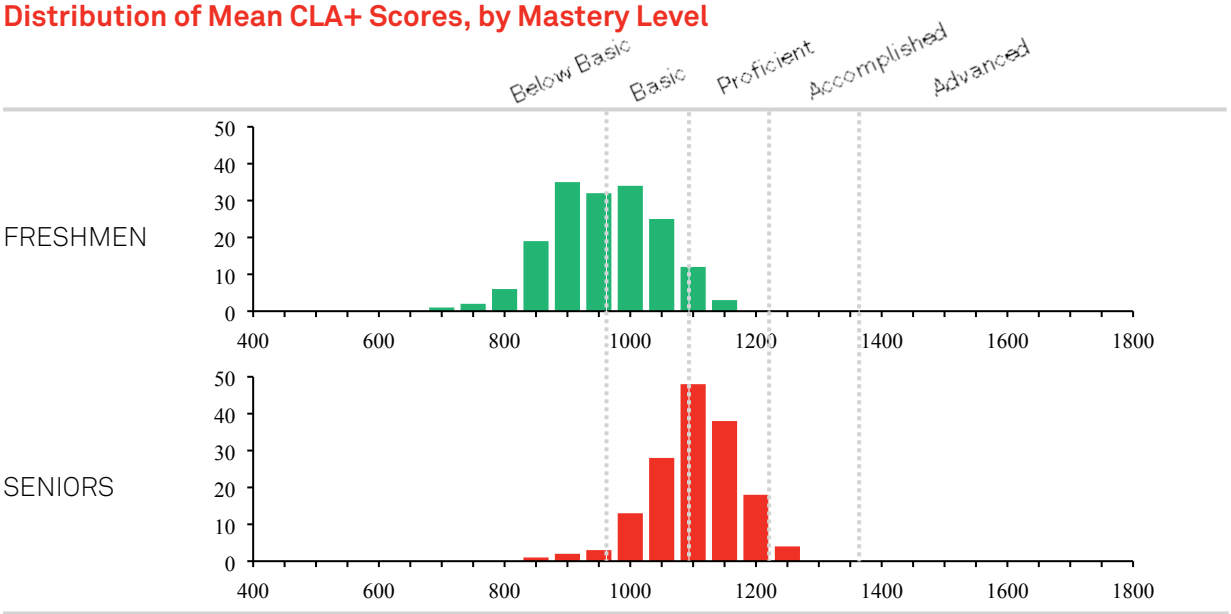
### Summary of CLA+ Results Across Institutions, by Class

| | | MEAN SCORE | STANDARD DEVIATION | 25TH PERCENTILE SCORE | 75TH PERCENTILE SCORE | MEAN EFFECT SIZE V. FRESHMEN* |
|---|---|---|---|---|---|---|
| TOTAL CLA+ SCORE | Freshmen | 1032 | 86 | 974 | 1096 | -- |
| | Seniors | 1128 | 70 | 1090 | 1170 | 0.62 |
| PERFORMANCE TASK | Freshmen | 1028 | 93 | 967 | 1089 | -- |
| | Seniors | 1117 | 75 | 1072 | 1168 | 0.47 |
| SELECTED-RESPONSE QUESTIONS | Freshmen | 1036 | 83 | 974 | 1089 | -- |
| | Seniors | 1140 | 72 | 1098 | 1186 | 0.55 |
| ENTERING ACADEMIC ABILITY | Freshmen | 1022 | 114 | 948 | 1106 | -- |
| | Seniors | 1058 | 96 | 993 | 1129 | -- |

* 141 institutions tested both freshmen and seniors.

## SECTION D2: DISTRIBUTION OF MASTERY LEVELS ACROSS INSTITUTIONS

### Distribution of Mean CLA+ Scores, by Mastery Level



## **SECTION D4:** CLA+ SUBSCORES ACROSS INSTITUTIONS

### Performance Task: Mean Distribution of Subscores (in percentages)




*NOTE: The Performance Task subscore categories are scored on a scale of 1 through 6.*

### Selected-Response Questions: Mean Subscores Across Institutions

| | SCIENTIFIC & QUANTITATIVE REASONING | | | CRITICAL READING & EVALUATION | | | CRITIQUE AN ARGUMENT | | |
|---|---|---|---|---|---|---|---|---|---|
| | Mean Score | 25th Percentile Score | 75th Percentile Score | Mean Score | 25th Percentile Score | 75th Percentile Score | Mean Score | 25th Percentile Score | 75th Percentile Score |
| FRESHMEN | 499 | 473 | 519 | 498 | 476 | 520 | 498 | 471 | 524 |
| SENIORS | 546 | 524 | 567 | 541 | 522 | 559 | 538 | 520 | 560 |

*NOTE: The selected-response section subscores are reported on a scale ranging approximately from 200 to 800.*

## **SECTION D5:** STUDENT EFFORT AND ENGAGEMENT ACROSS CLA+ INSTITUTIONS

### Mean Student Effort and Engagement Survey Responses

*How much effort did you put into the written-response task/ selected-response questions?*

| | | NO EFFORT AT ALL | A LITTLE EFFORT | A MODERATE AMOUNT OF EFFORT | A LOT OF EFFORT | MY BEST EFFORT |
|---|---|---|---|---|---|---|
| **PERFORMANCE TASK** | Freshmen | 1% | 5% | 35% | 35% | 24% |
| | Seniors | 1% | 4% | 35% | 36% | 24% |
| **SELECTED-RESPONSE QUESTIONS** | Freshmen | 2% | 14% | 42% | 28% | 14% |
| | Seniors | 2% | 11% | 41% | 30% | 17% |

*How engaging did you find the written-response task/ selected-response questions?*

| | | NOT AT ALL ENGAGING | SLIGHTLY ENGAGING | MODERATELY ENGAGING | VERY ENGAGING | EXTREMELY ENGAGING |
|---|---|---|---|---|---|---|
| **PERFORMANCE TASK** | Freshmen | 7% | 17% | 42% | 28% | 6% |
| | Seniors | 7% | 15% | 40% | 31% | 7% |
| **SELECTED-RESPONSE QUESTIONS** | Freshmen | 15% | 27% | 38% | 17% | 3% |
| | Seniors | 12% | 25% | 40% | 19% | 4% |

## **SECTION D6:** STUDENT SAMPLE SUMMARY ACROSS CLA+

### Student Sample Summary Across CLA+ Institutions

| DEMOGRAPHIC CHARACTERISTIC | | FRESHMEN Mean % | SENIORS Mean % |
|---|---|---|---|
| **TRANSFER** | Transfer Students | -- | 14% |
| | Non-Transfer Students | -- | 86% |
| **GENDER** | Male | 39% | 36% |
| | Female | 60% | 60% |
| | Decline to State | 2% | 3% |
| **PRIMARY LANGUAGE** | English | 80% | 84% |
| | Other | 20% | 16% |
| **FIELD OF STUDY** | Sciences & Engineering | 26% | 21% |
| | Social Sciences | 10% | 17% |
| | Humanities & Languages | 11% | 17% |
| | Business | 14% | 16% |
| | Helping / Services | 26% | 23% |
| | Undecided / Other / N/A | 14% | 6% |
| **FIELD/ ETHNICITY** | American Indian / Alaska Native / Indigenous | 1% | 1% |
| | Asian (including Indian subcontinent and Philippines) | 8% | 9% |
| | Native Hawaiian or other Pacific Islander | 1% | 1% |
| | African-American / Black (including African and Caribbean), non-Hispanic | 14% | 9% |
| | Hispanic or Latino | 19% | 12% |
| | White (including Middle Eastern), non-Hispanic | 50% | 59% |
| | Other | 4% | 3% |
| | Decline to State | 4% | 6% |
| **PARENT EDUCATION** | Less than High School | 8% | 5% |
| | High School | 24% | 17% |
| | Some College | 24% | 27% |
| | Bachelor's Degree | 27% | 29% |
| | Graduate or Post-Graduate Degree | 18% | 23% |

# APPENDIX E: INSTITUTIONAL SAMPLE

The institutional sample for CLA+ is comprised of schools that tested freshmen in fall 2013 and schools that tested sophomores, juniors, or seniors in spring 2014.

While the sample changed annually for the CLA, it will remain fixed for CLA+. The stable sample allows institutions to track their progress more easily. As institutions make national comparisons from year to year, they will no longer face the question of whether changes in percentile rankings reflect changes in institutional performance or differences in the comparative sample.

To ensure national representativeness, CAE will continue to assess the institutional sample. If significant changes arise, CAE will take steps to update the sample as necessary.

## SAMPLE REPRESENTATIVENESS

Students within the CLA+ institutional sample appear to be generally representative of students across CLA+ institutions with respect to Entering Academic Ability (EAA) scores. Specifically, across institutions, the average EAA score of freshmen in the CLA+ sample was only seven points higher than that of the average freshmen at CLA+ institutions (1038 versus 1031, over n=123 institutions that provided this information), and the average EAA score of seniors in the CLA+ sample was only 16 points higher than that of the average seniors at CLA+ institutions (1065 versus 1049, over n=119 institutions). The correlation between the average EAA score of freshmen in the CLA+ sample and their classmates was high (r=0.93), as was the correlation between the average EAA score of seniors in the CLA+ sample and their classmates (r=0.90).

These data suggest that, as a group, students tested as part of the CLA+ institutional sample perform similarly to all students at CLA+ institutions. This correspondence increases confidence in the inferences made about students at CLA+ institutions based on testing data collected from the institutional sample.

## CARNEGIE CLASSIFICATION

The following table shows groupings by Basic Carnegie Classification for colleges and universities across the nation and for CLA+ schools. The spread among CLA+ schools corresponds fairly well with that of the 1,683 four-year, not-for-profit institutions across the nation, though with a somewhat higher proportion of Master's colleges and universities.

Please note that counts in this table exclude colleges and universities that do not fall into these categories, such as Special Focus Institutions and schools based outside of the United States.

### Carnegie Classification of CLA+ Institutional Sample

| | NATION (N=1,683) | | CLA+ (N=157) | |
|---|---|---|---|---|
| **CARNEGIE CLASSIFICATION** | N | % | N | % |
| DOCTORATE-GRANTING UNIVERSITIES | 283 | 17 | 23 | 12 |
| MASTER'S COLLEGES AND UNIVERSITIES | 651 | 39 | 87 | 47 |
| BACCALAUREATE COLLEGES | 749 | 45 | 47 | 25 |

*Source: Carnegie Foundation for the Advancement of Teaching, Carnegie Classifications Data File, January 16, 2014.*

## SCHOOL CHARACTERISTICS

The following table provides statistics comparing important characteristics of colleges and universities across the nation with those of CLA+ schools. These statistics suggest that CLA+ schools are fairly representative of four-year, not-for-profit institutions nationwide. Public school percentage and undergraduate student body size are notable exceptions.

### School Characteristics of the CLA+ Institutional Sample

| SCHOOL CHARACTERISTIC | NATION | CLA+ |
|---|---|---|
| PERCENTAGE PUBLIC | 30 | 60 |
| PERCENTAGE HISTORICALLY BLACK COLLEGE OR UNIVERSITY (HBCU) | 4 | 3 |
| MEAN PERCENTAGE OF UNDERGRADUATES RECEIVING PELL GRANTS | 31 | 32 |
| MEAN SIX-YEAR GRADUATION RATE | 51 | 49 |
| MEAN BARRON'S SELECTIVITY RATING | 3.6 | 3.1 |
| MEAN ESTIMATED MEDIAN SAT SCORE | 1058 | 1030 |
| MEAN NUMBER OF FTE UNDERGRADUATE STUDENTS (ROUNDED) | 3,869 | 7,130 |
| MEAN STUDENT-RELATED EXPENDITURES PER FTE STUDENT (ROUNDED) | $12,330 | $10,469 |

*Sources: College Results Online dataset, managed by and obtained with permission from the Education Trust, covers most four -year Title IV-eligible higher-education institutions in the United States. Data were constructed from IPEDS and other sources. Because all schools did not report on every measure in the table, the averages and percentages may be based on slightly different denominators. Data also come from the Carnegie Foundation for the Advancement of Teaching, Carnegie Classifications Data File, January 16, 2014.*

## CLA+ INSTITUTIONS

The colleges and universities listed below in alphabetical order constitute the institutional sample for CLA+. To view a list of currently participating schools, please visit www.cae.org/claparticipants.

### CLA+ Schools

Alaska Pacific University
Antelope Valley College
Appalachian State University
Augsburg College
Augustana College (SD)
Aurora University
Barton College
Bellarmine University
Bob Jones University
Bowling Green State University
Bridgewater College
Brigham Young University-Idaho
California Maritime Academy
California Polytechnic State University, San Luis Obispo
California State Polytechnic University, Pomona
California State University, Bakersfield
California State University, Channel Islands
California State University, Chico
California State University, Dominguez Hills
California State University, East Bay
California State University, Fresno
California State University, Fullerton
California State University, Long Beach
California State University, Los Angeles
California State University, Monterey Bay
California State University, Monterey Bay, Computer Science and Information Technology
California State University, Northridge
California State University, Sacramento
California State University, San Bernardino
California State University, San Marcos
California State University, Stanislaus
Centenary College of Louisiana
Christopher Newport University
Clarke University
College of Saint Benedict/Saint John's University
Collin College

Colorado Christian University
Concord University
Concordia College
Culver-Stockton College
CUNY - Baruch College
CUNY - Borough of Manhattan Community College
CUNY - Bronx Community College
CUNY - Brooklyn College
CUNY - College of Staten Island
CUNY - Hostos Community College
CUNY - Hunter College
CUNY - John Jay College of Criminal Justice
CUNY - Kingsborough Community College
CUNY - LaGuardia Community College
CUNY - Lehman College
CUNY - Medgar Evers College
CUNY - New York City College of Technology
CUNY - Queens College
CUNY - Queensborough Community College
CUNY - The City College of New York
CUNY - York College
Dillard University
Drexel University, Department of Architecture and Interiors
Earlham College
East Carolina University
Eastern Connecticut State University
Emory & Henry College
Fayetteville State University
Flagler College
Florida International University Honors College
Frostburg State University
Georgia College & State University
Great Basin College
Hamline University
Hardin-Simmons University
Hastings College
Hesston College
Hong Kong Polytechnic University
Howard Community College
Humboldt State University
Illinois College
Indiana University of Pennsylvania
Jacksonville State University
Keene State College
Kent State University
Kepler Kigali
Keuka College
LaGrange College
Lake Forest College
Lee University
Lewis University
Lynchburg College
Marshall University
Miami University - Oxford
Miles College
Minneapolis College of Art and Design
Minnesota State Community & Technical College
Mississippi University for Women
Monmouth University
Montclair State University
Morgan State University
Morningside College
National Louis University
Nevada State College
New York University - Abu Dhabi
Newberry College
Nicholls State University
North Dakota State University
Nyack College
Ohio Wesleyan University
Our Lady of the Lake University
Pittsburg State University
Plymouth State University
Presbyterian College
Purchase College - SUNY
Quest University
Ramapo College of New Jersey
Robert Morris University
Roger Williams University
Saginaw Valley State University
San Diego State University
San Francisco State University
San Jose State University
Schreiner University
Shepherd University
Shippensburg University
Sonoma State University
Southern Connecticut State University
Southern New Hampshire University
Southern Virginia University
Southwestern University
St. Ambrose University
St. John Fisher College
Stetson University
Stonehill College
SUNY Cortland
Texas A&M International University
Texas A&M University-Texarkana
Texas State University-San Marcos
Texas Tech University
The Citadel
The College of Idaho
The Ohio State University
The Richard Stockton College of New Jersey
The Sage Colleges
Truckee Meadows Community College
Truman State University
University of Bridgeport
University of Colorado, Boulder
University of Evansville
University of Great Falls
University of Guam
University of Hawaii at Hilo, College of Business and Economics
University of Houston
University of Jamestown
University of Louisiana at Lafayette

University of Missouri - St. Louis
University of New Mexico
University of North Carolina Pembroke
University of North Dakota
University of Saint Mary
University of Texas - Pan American
University of Texas at Arlington
University of Texas at Austin
University of Texas at El Paso
University of Texas of the Permian Basin
University of Texas, Dallas
University of Texas, San Antonio
University of Texas, Tyler
Ursuline College
Walsh College of Accountancy and Business Administration
Warner University
Weber State University
West Chester University of Pennsylvania
Western Carolina University
Western Governors University
Western Michigan University
Western Nevada College
Westminster College (MO)
Westminster College (UT)
Wichita State University
Wichita State University, School of Engineering
Wiley College
William Peace University
William Woods University
Wisconsin Lutheran College
Yakima Valley Community

# APPENDIX F: CLA+ TASKS

## INTRODUCTION TO CLA+ PERFORMANCE TASKS AND SELECTED-RESPONSE QUESTIONS

CLA+ includes one Performance Task (PT) and 25 Selected-Response Questions (SRQs). All items are administered online. Each PT consists of an open-ended prompt that asks students to provide a constructed response. Every SRQ presents students with four options and asks them to choose a single answer. The SRQs are further organized into three sets, each focusing on a different skill area.

Questions that appear on CLA+ call on students to use critical-thinking and written-communication skills as they perform cognitively demanding tasks. The integration of these skills mirrors the requirements of serious thinking and writing faced outside of the classroom.

## OVERVIEW OF THE CLA+ PERFORMANCE TASK (PT)

Each PT asks students to answer an open-ended question about a hypothetical yet realistic situation. The prompt requires students to integrate analytical reasoning, problem solving, and written-communication skills as they consult materials in a Document Library and use them to formulate a response. The library includes a range of informational sources, such as letters, memos, summaries of research reports, newspaper articles, maps, photographs, diagrams, tables, charts, and interview notes or transcripts. Each PT is typically accompanied by four to nine documents, and students have 60 minutes to prepare their responses.

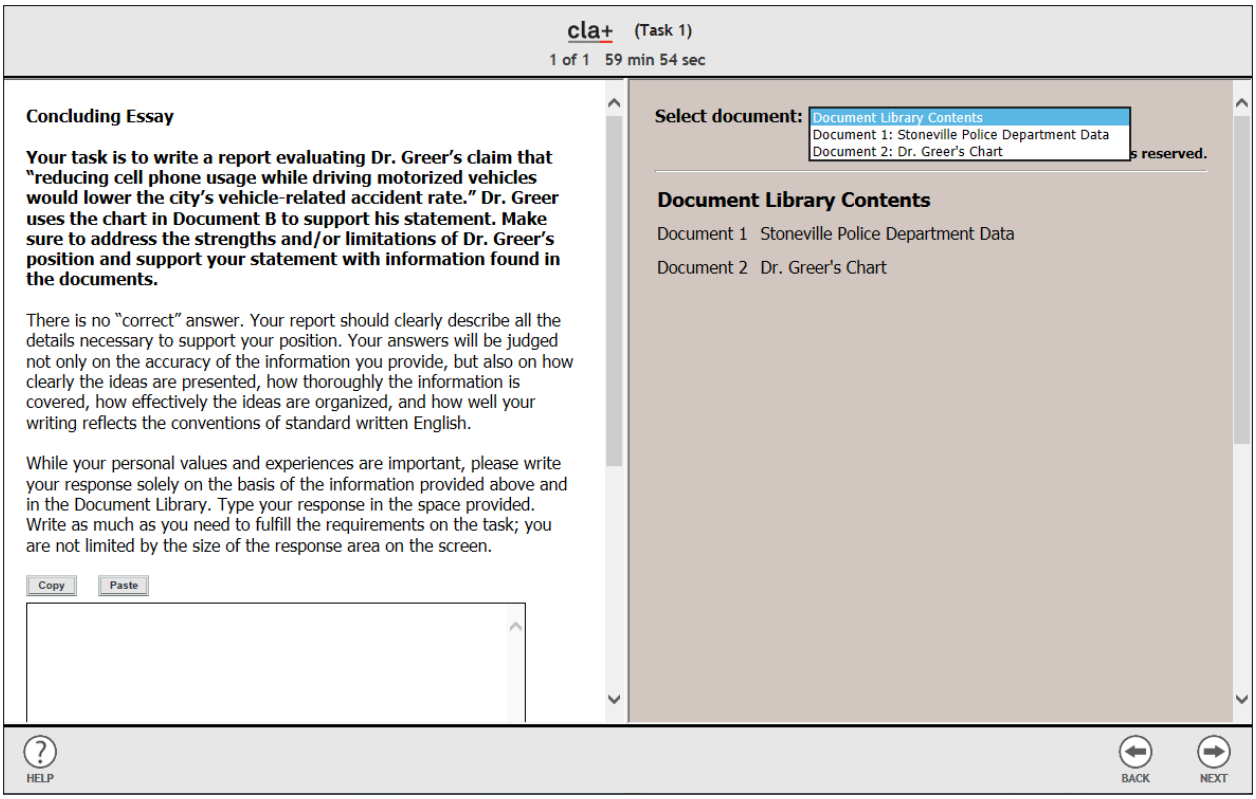
The first screen of each PT contains general instructions and an introduction to the scenario. The second screen is split. On the right side, students have a list of the informational sources in the Document Library. By using the pull-down menu, they can select and view each document. On the left side of the screen, students can read the question in the PT and enter their response in a field that has no word limit. An example of the split screen is shown on the following page.

Each PT assesses a unique combination of skills—no two are exactly the same. Some PTs ask students to identify, compare, and contrast the strengths and limitations of alternate hypotheses, points of view, courses of action, etc. Other PTs ask students to review a collection of materials and choose amongst a set of options to solve a problem or propose a new solution to the problem. Still other PTs ask students to suggest or select a course of action that resolves conflicting or competing strategies and to provide a rationale for their decision, explaining why one approach is better than another. For example, students may be asked to anticipate potential difficulties or hazards associated with different ways of addressing a problem, propose likely short- and long-term consequences of these strategies, and defend one or more of these approaches.

PTs require students to utilize higher order thinking skills, more specifically, to

- recognize information that is relevant and not relevant to the task at hand;
- analyze and understand data in tables and figures;
- evaluate the credibility of various documents;
- distinguish rational arguments from emotional ones;
- determine the difference between fact and opinion;
- identify questionable or critical assumptions;
- deal with inadequate, ambiguous, or conflicting information;
- spot deception, possible bias, and logical flaws in arguments;
- identify additional information that would help resolve issues;
- weigh different types of evidence;
- organize and synthesize information from several sources; and
- marshal evidence from different sources in a written response.

To view a sample PT, please visit the Sample Tasks section of CAE's website at www.cae.org/cla.




*Preview of the Performance Task Document Library*

## OVERVIEW OF THE CLA+ SELECTED-RESPONSE QUESTIONS (SRQs)

Like the PT, the 25 SRQs measure an integrated set of critical-thinking skills. Students utilize these skills to answer three sets of questions. The first measures scientific and quantitative reasoning, the second measures critical reading and evaluation, and the third (critique an argument) measures students' ability to identify logical fallacies and questionable assumptions. This final set requires students to detect logical flaws and questionable assumptions. Also like the PT, each question set is document-based and includes one to three informational sources of varying natures. Students are instructed to use these materials when preparing their answers within the 30 minutes provided.

The first two question sets require students to draw on the information and arguments provided in accompanying materials. Each set contains 10 questions, for a total of 20 questions.

Supporting documents for the **Scientific and Quantitative Reasoning** set discuss real-life research results. To answer questions in this section, students must apply critical-thinking skills that include

- making inferences and hypotheses based on given results,
- evaluating the reliability of information (such as experimental design or data collection methodology),
- identifying information or quantitative data that is connected and conflicting,
- detecting questionable assumptions (such as implications of causation based on correlation),
- supporting or refuting a position,
- drawing a conclusion or deciding on a course of action to solve a problem,
- evaluating alternate conclusions, and
- recognizing when a text has open issues that require additional research.

Supporting documents for the **Critical Reading and Evaluation** set present debates, conversations, and literary or historical texts with opposing views on authentic issues. To answer questions in this section, students apply critical-thinking skills that include

- supporting or refuting a position,
- analyzing logic,
- identifying assumptions in arguments,

- evaluating the reliability of information,
- identifying connected and conflicting information, and
- making justifiable inferences.

In the **Critique an Argument** set, students are presented with a brief argument about an authentic issue and asked to analyze the argument. To answer the five questions in this section, students must apply critical-thinking skills that include

- evaluating the reliability of information, including potential biases or conflicts of interest;
- detecting logical flaws and questionable assumptions;
- addressing additional information that could strengthen or weaken the argument; and
- evaluating alternate conclusions.

To view sample SRQs, please visit the Sample Tasks section of CAE's website at www.cae.org/cla.

## ASSESSMENT DEVELOPMENT

CAE has a team of experienced writers who work with educational researchers and editorial reviewers to generate ideas and design carefully constructed performance tasks (PTs), selected-response questions (SRQs), and supporting documents. Each group contributes to the development and revision of these materials.

**PT Development**
Throughout development, writers, researchers, and reviewers refine materials to ensure that each PT can support a variety of different approaches. The prompt must be sufficiently focused to guide students purposefully while providing them with the flexibility to demonstrate independent thinking. Questions must further be structured so students need to analyze and evaluate multiple sources of information from the Document Library to draw conclusions and justify their arguments.

Accompanying documents must present information in various formats and text types (e.g., tables, figures, news articles, editorials, emails, etc.). They must also provide enough information for students to formulate a number of reasonable arguments in response to the prompt. To achieve these goals, the development team drafts and revises a list of the intended content within each document. The list is used to check that each piece of information is clearly provided in the documents and that unwanted information is not embedded. During the editorial process, information is added and removed from the documents to ensure that students can reach approximately three to four different conclusions. Typically, some conclusions are better supported by available evidence than others.

The document list also serves as a starting point for scorer training and is used in alignment with analytic descriptions in the PT scoring rubrics. After several rounds of revisions, the most promising PTs are selected for piloting. During this stage, student responses are examined to identify any lack of clarity in the prompt or any unintentional ambiguity or unuseful information in the accompanying documents. After revisions are made, PTs that meet expectations by eliciting a full range and variety of responses become operational.

**SRQ Development**
The development process for SRQs is similar to the one used for PTs. Writers create documents that are based on real-life data and topics and can support questions measuring higher-order thinking skills. When crafting these documents, writers present valid and invalid assumptions and conclusions, devise alternate hypotheses and conclusions, incorporate flawed arguments, and leave some issues intentionally unanswered. These characteristics serve as a foundation for the creation of SRQs.

When reviewing item sets, editors work with writers to confirm that correct answer options are in fact correct based on information provided in the documents. Editors and writers also ensure that incorrect answer options are not potentially plausible. Throughout this process, the development team also checks to make sure that questions assess the intended critical-thinking skills.

After several rounds of revision, the most promising SRQs are selected for piloting. During this stage, student responses are examined to identify any errors or lack of clarity in questions and answer options. Responses are also reviewed to check whether accompanying documents contain unintentional ambiguity or unuseful information.
After revisions are made, SRQs that function well—questions that are of appropriate difficulty and that effectively discriminate between high- and low-performing students—become operational.

# APPENDIX G: SCORING CLA+

## SCORING CRITERIA

Student responses to **Performance Tasks** are scored in three skill areas: Analysis and Problem Solving, Writing Effectiveness, and Writing Mechanics. Students receive criterion-referenced subscores for each skill category based on key characteristics of their written responses. These characteristics are described in detail within the Performance Task rubric, available on CAE's website at www.cae.org/claptrubric.

**Selected-Response Questions** are scored based on the number of correct responses that students provide. Each of three question sets represents a skill area: Scientific and Quantitative Reasoning (10 questions), Critical Reading and Evaluation (10 questions), and Critique an Argument (5 questions). Because some question sets may be more difficult than others, the subscores for each category are adjusted to account for these differences and reported on a common scale. See Appendix J, *Scaling Procedures*, for more information about the scaling process.

## THE SCORING PROCESS

During the piloting of **Performance Tasks (PTs)**, all student responses are double-scored. Human scorers undertake this process, and the documentation they assemble is later used to train more scorers and program the machine-scoring engine for operational test administrations.

CAE uses a combination of human and automated scoring for its operational PTs. Student responses are scored twice: once by a human scorer and once by the Intelligent Essay Assessor (IEA). This automated scoring engine was developed by Pearson Knowledge Technologies to evaluate textual meaning, not just writing mechanics. Using a broad range of CLA+ student responses and human-generated scores, Pearson has trained the IEA to evaluate CLA+ PTs in a manner that maintains consistency between human and automated scoring.

The rigorous training that candidates undergo to become certified CLA+ scorers further promotes the validity and reliability of the scoring process. Training sessions include an orientation to the prompts, scoring guides, and rubrics; extensive feedback and discussion after the evaluation of each student response; and repeated practice grading a wide range of student responses.

To ensure the continuous calibration of human scorers, CAE has also developed the E-Verification system for its online scoring interface. This system calibrates scorers by having them evaluate previously-scored responses, or "Verification Papers," throughout the scoring process. Designed to improve and streamline scoring, the E-Verification system periodically substitutes student responses with Verification Papers. These papers are not flagged for the scorers, and the system does not indicate when scorers have successfully evaluated them. However, if a scorer fails to assess a series of Verification Papers accurately, that scorer is targeted for additional coaching in a remediation process or is permanently removed from scoring.

Each student response receives three subscores in Analysis and Problem Solving, Writing Effectiveness, and Writing Mechanics. The subscores are assigned on a scale of 1 (lowest) to 6 (highest). Blank responses or responses unrelated to the task (e.g., what a student had for breakfast) are flagged for removal from test results.

Students also receive three subscores for the **Selected-Response Questions (SRQs)**, one for each of the sets, which measure Scientific and Quantitative Reasoning, Critical Reading and Evaluation, and Argument Critique. Unless a student fails to start the section or is unable to finish due to a technical glitch or connection error, any unanswered SRQs are scored as incorrect. However, if a student does not attempt at least half of the SRQs, the student will not receive a score for the section. Subscores are determined by the number of correct responses, adjusted based on item difficulty, and reported on a common scale. The adjustment ensures that scoring is consistent, for example, whether a student answers seven questions correctly in an easier set or six in a more difficult one. Scores are equated so that each subscore category has the same mean and standard deviation and all test forms are comparable. Score values range from approximately 200 to 800 for each SRQ section.

# APPENDIX H: MASTERY LEVELS

## SETTING STANDARDS FOR CLA+

Following the creation of CLA+, a standard-setting study was conducted to establish fair and defensible levels of mastery for the new and improved assessment. This formal study was held at CAE headquarters in New York City on December 12, 2013. Twelve distinguished panelists, representing a variety of educational and commercial sectors, were invited to participate. The table below lists each panelist.

During the standard-setting study, panelists defined descriptions of three mastery levels: Basic, Proficient, and Advanced. A fourth level, Accomplished, was added in November 2014 using the same methodology and the same panelists. Panelists' discussions were based on the CLA+ scoring rubric as well as the knowledge, skills, and abilities required to perform well on CLA+. The purpose of this activity was to develop consensus among the judges regarding each mastery level and to create a narrative profile of the knowledge, skills, and abilities necessary for CLA+ students.

During subsequent rating activities, panelists relied on these consensus profiles to make item performance estimates. Judges broke into three groups of four, and each group evaluated characteristics related to one mastery level. The groups then reconvened and reported their findings to the group at large so they could form final consensus on student performance at each of the three mastery levels.

### CLA+ Standard-Setting Study Participant List and Institutional Affiliation

| PARTICIPANT | INSTITUTION |
|---|---|
| Aviva Altman | Johnson & Johnson |
| Jon Basden | Federal Reserve |
| Mark Battersby | Capilano University (Canada) |
| Paul Carney | Minnesota State Technical and Community College |
| Anne Dueweke | Kalamazoo College |
| Terry Grimes | Council of Independent Colleges |
| Sonia Gugga | Columbia University |
| Marsha Hirano-Nakanishi | California State University System |
| Rachel L. Kay | McKinsey & Company |
| Michael Poliakoff | American Council of Trustees and Alumni |
| Elizabeth Quinn | Fayetteville State University |
| Paul Thayer | Colorado State University |

## CLA+ MASTERY LEVELS

CAE uses outcomes from the 2013 standard-setting study to distinguish between CLA+ students with varying knowledge, skills, and abilities as measured by the assessment. On individual reports, Mastery Levels are determined by students' Total CLA+ scores. On institutional reports, they are determined by each class level's mean Total CLA+ score.

Institutions should not use mastery levels for purposes other than the interpretation of test results. If an institution wishes to use the attainment of CLA+ mastery levels as part of a graduation requirement or the basis for an employment decision, the institution should conduct a separate standard-setting study with this specific purpose in mind.

The following table summarizes each level of mastery and provides a description of students below the basic level of mastery.

## Student Levels of Mastery Profiles

| LEVEL OF MASTERY | PROFILE |
|---|---|
| BELOW BASIC | Students who are below basic do not meet the minimum requirements to merit a basic level of mastery. |
| BASIC | Students at the basic level should be able to demonstrate that they at least read the documents, made a reasonable attempt at an analysis of the details, and are able to communicate in a manner that is understandable to the reader. Students should also show some judgment about the quality of the evidence.<br><br>Students at the basic level should also know the difference between correlation and causality. They should be able to read and interpret a bar graph, but not necessarily a scatter plot or comprehend a regression analysis. Tables may be out of reach for basic students as well. |
| PROFICIENT | Students at the proficient level should be able to extract the major relevant pieces of evidence provided in the documents and provide a cohesive argument and analysis of the task. Proficient students should be able to distinguish the quality of the evidence in these documents and express the appropriate level of conviction in their conclusion given the provided evidence. Additionally, students should be able to suggest additional research and/or consider the counterarguments. Minor errors in writing need to be defined rigorously.<br><br>Proficient students have the ability to correctly identify logical fallacies, accurately interpret quantitative evidence, and distinguish the validity of evidence and its purpose. They should have the ability to determine the truth and validity of an argument. Finally, students should be able to know when a graph or table is applicable to an argument. |
| ACCOMPLISHED | Students at the accomplished level of mastery should be able to analyze the information provided in the documents, extract relevant pieces of evidence, and make correct inferences about this information. Accomplished students should be able to identify bias, evaluate the credibility of the sources, and craft an original and independent argument. When appropriate, students will identify the need for additional research or further investigation. They will refute some, but not all of the counterarguments within the documents and use this information to advance their argument. Accomplished students also have the ability to correctly identify logical fallacies, accurately interpret and analyze qualitative and quantitative evidence (e.g., graphs and charts), and incorporate this information into their argument. Students will be able to correctly identify false claims and other sources of invalid information and integrate this information in their responses.<br><br>Student responses are presented in a cohesive and organized fashion. There may be infrequent or minor errors in writing fluency and mechanics, but they will not detract from the reader's comprehension of the text. |
| ADVANCED | Students at the advanced level demonstrate consistency, completeness, and show a command of the English language in their response. They have a level of sophistication that is not seen in the proficient or basic levels. Advanced students create and synthesize the provided evidence, are comfortable with ambiguity, are able to structure their thoughts, understand causality, add new ideas, and introduce new concepts in order to create or seek new evidence. They think about conditions and nuances and express finer points and caveats by proposing a conditional conclusion.<br><br>The students at this level display creativity and synthesis, while understanding the finer points in the documents. For example, advanced students will be able to synthesize the information across multiple documents and address the ambiguities in the data that are presented, such as outliers and knowing how sample size affects outcomes. Advanced students will also be able to identify and highlight gaps in logic and reasoning. |

# APPENDIX I: DIAGNOSTIC GUIDANCE

## INTERPRETING CLA+ RESULTS

CLA+ test results can be used to evaluate an institution's overall performance on tasks measuring higher-order thinking skills. Test results can also be used to determine an individual student's areas of relative strength and weakness.

Examining performance across both CLA+ sections can serve as a comprehensive diagnostic exercise since the combination of necessary knowledge, skills, and abilities differs for the Performance Task (PT) and the Selected-Response Questions (SRQs). The PT measures Analysis and Problem Solving, Writing Effectiveness, and Writing Mechanics, while the SRQs measure Scientific and Quantitative Reasoning, Critical Reading and Evaluation, and Critique an Argument (the detection of logical flaws and questionable assumptions).

SRQ subscores are assigned based on the number of questions answered correctly; this value is then adjusted to account for item difficulty, and the adjusted value is converted to a common scale. Established in relation to the test performance of freshmen in the fall of 2013, the scale has a mean of 500 and a standard deviation of 100. SRQ subscores thus range from approximately 200 to 800.

PT subscores are assigned on a scale of 1 (lowest) to 6 (highest). Unlike the SRQ subscores, PT subscores are not adjusted for difficulty. These subscores remain as is because they are intended to facilitate criterion-referenced interpretations. For example, a score of "4" in Analysis and Problem Solving signifies that a response has certain qualities (e.g., "Provides valid support that addresses multiple pieces of relevant and credible information..."). Any adjustment to the score would compromise this interpretation.

The ability to make a claim such as, "Our students seem to be doing better in Writing Effectiveness than in Analysis and Problem Solving," is clearly desirable. These types of observations can be made by comparing the distributions for each subscore in Section 4 of your institutional report (specifically, on page 5). Please examine these test results in combination with the PT scoring rubric as well, available on CAE's website at www.cae.org/claptrubric.

CLA+ Mastery Levels further contextualize PT and SRQ subscores by interpreting test results in relation to the qualities exhibited by examinees. Each Mastery Level corresponds to specific evidence of critical-thinking and written-communication skills. Please see Appendix H, *Mastery Levels*, for detailed information about each Mastery Level.

## COMPARING RESULTS ACROSS ADMINISTRATIONS

One way to assess institutional performance is to track changes in CLA+ test scores over time. This goal can be achieved by testing a cohort of students longitudinally or by participating regularly in cross-sectional CLA+ administrations.

The CLA+ assessment format differs from that of its predecessor, the CLA. Therefore, direct score comparisons are not feasible for test data collected before and after fall 2013. However, scaling equations can be used to adjust CLA scores for the purpose of making comparisons with CLA+.

Schools wishing to relate current CLA+ test results to CLA results in previous years can use the following equation, derived by comparing the CLA and CLA+ total scores from 132 institutions that tested students on both forms of the assessment ($r$=0.881):

CLA scores from fall 2010 – spring 2013:

$$score_{CLA+} = 204.807 + (0.792 \cdot score_{CLA})$$

CLA scores from before fall 2010:

$$score_{CLA+} = 212.908 + (0.673 \cdot score_{CLA})$$

In addition to making direct score comparisons across earlier test administrations, schools can also use their percentile rankings to determine changes in performance relative to other CLA+ institutions.

Importantly, all test administrations after fall 2013 will be readily comparable. The institutional sample used for setting norms (percentile rankings, value-added parameters, etc.) will be fixed as of the 2013-14 academic year. So, any changes in value-added score or percentile ranking can now be attributed to a school's CLA+ test results rather than potential shifts in the norming sample.

# APPENDIX J: SCALING PROCEDURES

## CONVERTING CLA+ SCORES TO A COMMON SCALE

To provide CLA+ scores, CAE converts SRQ subscores and PT and SRQ section scores to a common scale of measurement.[1] This process allows us to combine score values from different assessment tasks and to compute mean scale scores for each CLA+ section. The process also lets us calculate a total average scale score for the examination based on performance within both sections.

For each **Performance Task (PT)**, raw subscores (for the three skill categories) are added to produce a raw section score. Because some PTs are more difficult than others, the raw section score is then converted to a common scale of measurement. The conversion produces scale scores that maintain comparable levels of proficiency across performance tasks and test forms. So, for example, a CLA+ scale score would indicate the same percentile rank regardless of the task a student received.

For the PT, CAE uses a linear transformation when converting raw scores to scale scores. The process creates a scale score distribution for CLA+ freshmen that has the same mean and standard deviation as their combined SAT Math and Critical Reading (or converted ACT) scores. The transformation was defined using data from college freshmen who took CLA+ in fall 2013. This type of scaling preserves the shape of the raw score distribution and maintains the relative standing of students. For example, the student with the highest raw score on a PT will also have the highest scale score for that task; the student with the next highest raw score will be assigned the next highest scale score, and so on.

This scaling practice ensures that a very high PT raw score (not necessarily the highest possible score) corresponds approximately to the highest SAT (or converted ACT) score earned by a freshman testing in fall 2013. Similarly, a very low PT raw score would be assigned a scale score value close to the lowest SAT (or converted ACT) score earned by a freshman taking CLA+ in fall 2013. On rare occasions when students earn exceptionally high or low raw PT scores, their scale scores may fall outside the normal SAT Math and Critical Reading score range of 400 to 1600.

For the **Selected-Response Questions (SRQs)**, raw subscores (for the three skill categories measured by the three question sets) are determined based on the number of correct responses. These raw subscores are first equated and then placed on a common scale. This process adjusts the subscores based on the difficulty of the item sets so the subscores have the same mean and standard deviation across all question sets. Comparisons can then be made across test forms.

Using a linear transformation, CAE then converts the equated subscores to a more interpretable scale with a mean of 500 and standard deviation of 100, again, based on data from freshmen taking CLA+ in fall 2013. This scale produces SRQ subscores ranging from approximately 200 to 800, similar to the subsections of the SAT.

The weighted average of the SRQ subscores is then transformed again, using the same scaling parameters as the PT. As before, the process creates a scale score distribution for CLA+ freshmen that has the same mean and standard deviation as their combined SAT Math and Critical Reading (or converted ACT) scores. The transformation is based on data from college freshmen who took CLA+ in fall 2013. The application of common parameters places both CLA+ section scores on the same scale.

Finally, CLA+ **Total Scores** are calculated by taking the average of the two CLA+ section scores. Thus, students who do not complete or provide scorable responses for both sections of the assessment do not receive Total CLA+ scores.

[1] Again, PT subscores are not adjusted because they support criterion-referenced interpretations based on the use of a scoring rubric.

## SCALING EAA SCORES

Entering Academic Ability (EAA) is determined based on one of three sets of scores: (1) combined SAT Math and Critical Reading, (2) ACT Composite, or (3) Scholastic Level Examination (SLE) scores.

To facilitate testing comparisons across schools, CAE converts ACT scores to the scale of measurement used to report combined SAT Math and Critical Reading scores. We use the ACT-SAT crosswalk below for this purpose.

CAE administers the SLE at schools in which a majority of students lacks SAT or ACT scores (e.g., two-year institutions and open-admission schools). In these instances, the SLE, a short-form cognitive ability measure produced by Wonderlic, Inc., is added to CLA+. SLE scores are then converted to the SAT score scale using data from 1,148 students who took the CLA in spring 2006 and had both SAT and SLE scores.

SAT, converted ACT, and converted SLE scores are all referred to as EAA scores.

**Standard ACT to SAT Crosswalk**

| ACT | SAT |
|---|---|
| 36 | 1600 |
| 35 | 1560 |
| 34 | 1510 |
| 33 | 1460 |
| 32 | 1420 |
| 31 | 1380 |
| 30 | 1340 |
| 29 | 1300 |
| 28 | 1260 |
| 27 | 1220 |
| 26 | 1190 |
| 25 | 1150 |
| 24 | 1110 |
| 23 | 1070 |
| 22 | 1030 |
| 21 | 990 |
| 20 | 950 |
| 19 | 910 |
| 18 | 870 |
| 17 | 830 |
| 16 | 790 |
| 15 | 740 |
| 14 | 690 |
| 13 | 640 |
| 12 | 590 |
| 11 | 530 |

*Source:* ACT (2008). *ACT/College Board Joint Statement.* Retrieved from http://www.act.org/aap/concordance/pdf/report.pdf

# APPENDIX K: MODELING DETAILS

## MODELING STUDENT-LEVEL SCORES

When determining value-added scores on the student level, an equation like the one below is used to model the relationship between the Entering Academic Ability (EAA) scores of senior students and their CLA+ scores:

$$CLA_{ij} = \bar{CLA}_j + 0.48\left(EAA_{ij} - \bar{EAA}_j\right) + r_{ij}$$

In this equation, $CLA_{ij}$ represents the CLA+ score of senior student $i$ in school $j$. This value is modeled as a function of school $j$'s average senior CLA+ score ( $\bar{CLA}_j$) and student $i$'s EAA score ($EAA_{ij}$) minus the average EAA score of all participating seniors at school $j$ ($\bar{EAA}_j$). Essentially, the senior student's CLA+ score in this equation equals (1) the school's average senior CLA+ score plus (2) an adjustment based on the student's EAA score relative to the average EAA score of all senior participants in school $j$ plus (3) residual term $r_{ij}$, which is equal to the difference between the student's observed and expected CLA+ performance. Further, the student-level slope coefficient for EAA is 0.48 in this equation, which indicates that for every 1 point difference in EAA, one would expect to see a 0.48 point difference in CLA+ performance.

To illustrate the use of this equation for computing a student's expected CLA+ score, consider a school with an average senior CLA+ score of 1200 and an average EAA score of 1130. A senior student in this school with an EAA score of 1080 would be expected to have a CLA+ score of $1200 + 0.48(1080 - 1130) + 0 = 1176$. For residual term $r_{ij}$, 0 indicates no difference between observed and expected performance, while positive numbers denote "better than expected" performance and negative numbers denote "worse than expected" performance. So, if this student actually scored a 1210 on CLA+, then residual term $r_{ij}$ would be +34 instead of 0 because this student would have scored 34 points higher than one would expect given his or her EAA. Using the equation described here would produce student-level deviation scores that differ slightly from those that inform the performance levels reported in your Student Data File.

## MODELING SCHOOL-LEVEL SCORES

During hierarchical linear modeling (HLM), value-added scores on the school level are derived using an equation such as the following:

$$\bar{CLA}_j = 450.47 + 0.44\left(\bar{EAA}_j\right) + 0.20\left(\bar{CLA}_{fr,j}\right) + u_j$$

In this equation, $\bar{CLA}_j$ represents the average senior CLA+ score at school $j$, $\bar{EAA}_j$ represents the average EAA score of all participating seniors at school $j$, $\bar{CLA}_{fr,j}$ represents the average CLA+ score of participating freshmen at school $j$, and $u_j$ represents the school's value–added score estimate. More specifically, $u_j$ is the difference between a school's observed and expected average senior CLA+ performance. In this equation, 450.47 is the school-level intercept for the total CLA+ score, 0.44 is the school-level slope coefficient for the average EAA score, and 0.20 is the school-level slope coefficient for the average freshman CLA+ score.

It may seem unconventional to use the average freshman CLA+ score as a predictor of the average senior CLA+ score, but analyses of CLA+ data consistently indicate that average freshman CLA+ performance adds significantly to this model. Average EAA and average freshman CLA+ performance are both useful in the model because they demonstrate distinct, significant characteristics of students as they enter college. Moreover, the model would not be credible as a means of computing value-added CLA+ scores if there were no control for CLA+ performance at the start of college.

To illustrate the use of this equation for estimating a school's value-added scores, consider the school we discussed above once again. This institution has an average freshman CLA+ score of 1050, an average senior CLA+ score of 1175, and an average senior EAA score of 1130. According to the school-level equation, one would expect the average senior CLA+ performance at this school to be $450.47 + 0.44(1130) + 0.20(1050) + 0 = 1158$.

However, the observed average senior CLA+ performance was 1190, which is 17 points higher

than the average senior CLA+ score expected at schools with similar EAA and freshman CLA+ scores. Once converted to a standard scale, the value-added score for this school would be 0.39, which would place the institution in the "Near Expected" performance level.

To expand on the significance of value-added scores and their proper interpretation, consider a group of CLA+ schools whose seniors had a similar set of academic skills upon entering college, as indicated by their average SAT, ACT, or SLE scores and their average CLA+ scores as freshmen. This similarity is critical as a basis of later comparison using value-added scores. If the average performance of seniors at one school in this group was better than the average performance of seniors at the other schools, one could infer that greater gains in critical thinking and written communication occurred at this school. That is, the school may have added greater value to its students' educational experience over the course of four years.

The major goal of value-added modeling is to obtain a benchmark of student performance based on demonstrated ability at the time of college entrance and to identify schools admitting similar students by applying this criterion. It is important to understand the types of comparisons that can be made using value-added scores as well as their limitations. For instance, a high value-added score does not necessarily indicate high absolute performance on CLA+. Schools with low absolute CLA+ performance may obtain high value-added scores by performing well relative to expectation (i.e., relative to the average performance of schools testing students with similar academic skills upon college entrance). Likewise, schools with high absolute CLA+ performance may obtain low value-added scores by performing poorly relative to expectation. Importantly, though it is technically acceptable to interpret value-added scores as relative to all other CLA+ schools after controlling for student characteristics, this approach is not advisable because it encourages false comparisons among disparate institutions.

## INTERPRETING CONFIDENCE INTERVALS

Value-added scores are estimates of unknown quantities–"best guesses" based on reported information. Given their inherent uncertainty, these estimates must be interpreted in light of available information about their precision. As described in Appendix C, *Explanation of Your Results*, value-added estimation using hierarchical linear modeling (HLM) provides standard errors which can be used to compute a unique 95% confidence interval for each school. These standard errors reflect variation in EAA and CLA+ scores within and between schools and are most strongly related to senior sample size. Schools testing larger samples have smaller standard errors and corresponding 95% confidence intervals—and therefore obtain more precise value-added estimates.

To illustrate the relationship between these components of estimation, let us return to the example school with a value-added score of 0.39. If the senior sample size at this institution were near 100, the school would have a standard error of 0.26 (on the standardized value-added score scale). The 95% confidence interval for this school would thus range from -0.12 to 0.90, which is calculated as the value-added estimate (0.39) plus or minus 1.96 multiplied by the standard error (0.26): $0.39 \pm (1.96)0.26$. To understand the significance of sample size, consider that the confidence interval would have been about 40% larger (from -0.34 to 1.12) if this school tested half as many students. Alternatively, it would have been about 80% smaller (from 0.29 to 0.49) if the school tested twice as many students.

One could draw several inferences from the 95% confidence interval calculated for the example school. First, the school's value-added score is significantly different from scores lower than -0.12 and greater than 0.90. Also, because 0 falls within this range, one might say the school's value-added score is not significantly different from 0. Here, it should be noted that a value-added score of 0 does *not* indicate the absence of learning, as if students made no gains at their institution. Rather, a value-added score of 0 reflects typical (or "near expected") average senior CLA+ performance, which implies educational outcomes typical of schools testing students with similar academic skills upon college entrance.

Inaccurate interpretations of confidence intervals are unfortunately common. For instance, it is *not* correct to say there is a 95% chance that the example school's "'true" value-added score is between -0.12 and 0.90. Rather, there is a 95% chance that the interval ranging between -0.12 and 0.90 includes the true value-added score. Chance lies in the identification of the correct range, not the existence of the score. Put another way, the confidence interval reflects uncertainty in the estimate of the true score due to sampling variation,

not uncertainty in the true score itself. Correctly interpreted, a 95% confidence interval indicates the variation in value-added score ranges we should expect to see if testing were repeated with different samples of students a large number of times. So, if testing were repeated 100 times with different samples of students, about 95 out of the 100 resulting confidence intervals would include a school's "true" value-added score.

## STATISTICAL SPECIFICATION OF THE CLA+ VALUE-ADDED MODEL

Level 1 (Student Level): $CLA_{ij} = \beta_{0j} + \beta_{1j}(EAA_{ij} - \bar{EAA}_j) + r_{ij}$

- $CLA_{ij}$ is the CLA+ score of student $i$ at school $j$.
- $EAA_{ij}$ is the Entering Academic Ability (EAA) score of student $i$ at school $j$.
- $\bar{EAA}_j$ is the mean EAA score at school $j$.
- $\beta_{0j}$ is the student-level intercept (equal to the mean CLA+ score at school $j$).
- $\beta_{1j}$ is the student-level slope coefficient for EAA at school $j$ (assumed to be the same across schools).
- $r_{ij}$ is the residual for student $i$ in school $j$, where $r_{ij} \sim N(0,\sigma^2)$ and $\sigma^2$ is the variance of the student-level residuals (the pooled within-school variance of CLA+ scores after controlling for EAA).

Level 2 (School Level): $\beta_{0j} = \gamma_{00} + \gamma_{01}(\bar{EAA}_j) + \gamma_{02}(\bar{CLA}_{fr,j}) + \mu_{0j}$ and $\beta_{1j} = \gamma_{10}$

- $\bar{EAA}_j$ is the mean EAA score at school $j$.
- $\bar{CLA}_{fr,j}$ is the mean freshman CLA+ score at school $j$.
- $\beta_{0j}$ is the student-level intercept (equal to the mean CLA+ score at school $j$).
- $\beta_{1j}$ is the student-level slope coefficient for EAA at school $j$ (assumed to be the same across schools).
- $\gamma_{00}$ is the school-level value-added equation intercept.
- $\gamma_{01}$ is the school-level value-added equation slope coefficient for senior mean EAA.
- $\gamma_{02}$ is the school-level value-added equation slope coefficient for freshman mean CLA+.
- $\gamma_{10}$ is the student-level slope coefficient for EAA (assumed to be the same across schools and thus equivalent to $\beta_{1j}$).
- $\mu_{0j}$ is the value-added equation residual for school $j$ (i.e., the value-added score), where $\mu_{0j} \sim N\left(\begin{bmatrix}0\\0\end{bmatrix},\begin{bmatrix}\tau_{00} & 0\\0 & 0\end{bmatrix}\right)$ and $\tau_{00}$ is the variance of the school-level residuals (the variance in mean CLA+ scores after controlling for mean EAA and mean freshman CLA+ scores).

Mixed Model (combining the school- and student-level equations and utilizing the same variables as above):

$$CLA_{ij} = \gamma_{00} + \gamma_{01}(\bar{EAA}_j) + \gamma_{02}(\bar{CLA}_{fr,j}) + \gamma_{10}(EAA_{ij} - \bar{EAA}_j) + \mu_{0j} + r_{ij}$$

## ESTIMATED PARAMETERS FOR THE VALUE-ADDED MODEL

Estimated Parameters for the Value-Added Model

| | $\gamma_{00}$ | $\gamma_{10}$ | $\gamma_{01}$ | $\gamma_{02}$ | STANDARD DEVIATION |
|---|---|---|---|---|---|
| TOTAL CLA+ SCORE | 450.47 | 0.48 | 0.44 | 0.20 | 43.56 |
| PERFORMANCE TASK | 442.73 | 0.39 | 0.35 | 0.29 | 52.50 |
| SELECTED-RESPONSE QUESTIONS | 454.37 | 0.57 | 0.50 | 0.14 | 43.71 |

The table above shows the estimated parameters for the CLA+ value-added model. Using these parameters and the instructions below (or the statistical models on the previous page), you will be able to compute the expected senior CLA+ score for your institution. In combination with the observed mean score for seniors at your school, you can then calculate your school's value-added score. Using these values, you can also perform subgroup analyses or make value-added estimates for student groups with longitudinal data.

## HOW TO CALCULATE CLA+ VALUE-ADDED SCORES

To calculate value-added scores for your students, you will need:

- Samples of entering and exiting students with EAA and CLA+ scores (See your CLA+ Student Data File.)
- The estimated parameters for the value-added model (See the table above.)

1. Refer to your CLA+ Student Data File to identify your subgroup sample of interest. The subgroup must contain freshmen and seniors with EAA and CLA+ scores.

2. Using your CLA+ Student Data File, compute:
   - The mean EAA score of seniors (exiting students) in the sample
   - The mean CLA+ score of freshmen (entering students) in the sample
   - The mean CLA+ score of seniors (exiting students) in the sample

3. Calculate the senior sample's expected mean CLA+ score, using the parameters from the table above. Please note that the same equation can be used for each CLA+ section score and for the Total CLA+ score as well by selecting the appropriate parameter values and inserting them into this equation:

$$expected\ mean\ CLA\ score = \gamma_{00} + \gamma_{01}(senior\ mean\ EAA) + \gamma_{02}(freshman\ mean\ CLA\ score)$$

4. Use your expected score to calculate your subgroup sample's value-added score:

$$value\text{-}added\ score,\ unstandardized = (senior\ mean\ CLA\ score) - (expected\ mean\ CLA\ score)$$

5. Convert that value-added score to standard deviation units, using the standard deviation value in the table above:

$$value\text{-}added\ score,\ standardized = \frac{value - added\ score,\ \ unstandardized}{Standard\ Deviation}$$

# APPENDIX L: PERCENTILE LOOK-UP TABLES

## PERCENTILE LOOK-UP TABLES FOR CLA+ SCORES

For schools interested in the distribution of CLA+ performance, CAE provides percentile tables that list scores for total CLA+, as well as each section of the examination (PT and SRQs) and EAA, all associated with a percentile value.

These tables are available on CAE's website. Institution-level percentile scores can be found at www.cae.org/claplusschoolpercentiles, and student-level percentile scores can be found at www.cae.org/claplusStudentpercentiles.

# APPENDIX M: STUDENT DATA FILE

## EXPLORING STUDENT DATA

In tandem with your institutional report, CAE provides a CLA+ Student Data File, which gathers content from three sources: CLA+ scores and identifiers computed by CAE, academic data and demographic information provided by your registrar, and self-reported information from your students' CLA+ online profiles and post-assessment surveys. Each piece of data in the spreadsheet is identified as a separate variable.

The Student Data File contains information identifying each student and the test administrations being reported. Here, you will also find testing times and a full range of scoring information, such as Performance Task (PT) subscores and section scores, Selected-Response Question (SRQ) subscores and section scores, and Total CLA+ scores. Other scoring information includes performance levels and percentile ranks for each section and the test as a whole, overall mastery levels, and Entering Academic Ability (EAA) scores.

The data file provides student grade point average and demographic information as well, including student responses to new survey questions regarding how much effort they put into each CLA+ section and how engaging they found these sections to be. Student responses may help contextualize individual scores and institutional results. These responses may also help schools identify motivational issues within participant groups, so schools can adjust their outreach and recruitment methods for future administrations.

Local Survey is a tool that allows institutions to add as many as nine questions of their own to the post-assessment survey. If an institution uses the Local Survey feature within the CLA+ testing platform, responses to these questions will also appear in the Student Data File. The set of combined questions allows schools to create a richer, customized collection of data to facilitate institutional research using CLA+.

You may link the student-level information in this file with other data you collect—for example, from the National Survey of Student Engagement (NSSE), the Cooperative Institutional Research Program (CIRP), or from local portfolios, assessments, or studies of course-taking patterns, specialized program participation, etc. The gathered information can help you hypothesize about a range of factors related to institutional performance.

Student-level scores were not originally designed to serve a diagnostic purpose at the individual level. However, with the advent of CLA+, these scores have greater utility. Student-level results can now be used for formative purposes, to identify areas of weakness for individual students and to help determine performance issues across participant groups. Schools may analyze the performance of student subgroups to determine whether certain students may benefit from targeted educational enhancements. Value-added scores may be estimated for these subgroups as well and compared to growth estimates across the institution.

Starting with the fall 2013 administration, student-level CLA+ results can now be compiled from year to year, yielding a larger and much richer data set than one gathering results from a single academic year. Student data aggregated across years will allow schools to track performance longitudinally so they can identify improvements in critical thinking and written communication made by their students.

# APPENDIX N: MOVING FORWARD

## WHAT NEXT?

The information presented in your institutional report is designed to help you better understand the contributions your school has made toward student learning. Yet, the report alone provides only a snapshot of student performance. By combining it with other tools and services that CLA+ has to offer, the institutional report can become part of a powerful evaluation and enrichment strategy. It can help you and your school target specific areas of improvement and align teaching, learning, and assessment effectively to enhance student performance over time.

We encourage institutions to examine CLA+ performance closely and review the results carefully with their educators. Schools can extend these analyses by linking student-level CLA+ outcomes with other data sources and pursuing in-depth sampling. Collaboration with peer schools and participation in professional development opportunities can support institutions and their educators further by showing how research findings can inform teaching practices and help improve student learning.

Using your Student Data File, you can relate student-level CLA+ results to data you collect on course-taking patterns, grade achievement, and other topics of inquiry. CLA+ subscores in Analysis and Problem Solving, Writing Effectiveness, Writing Mechanics, Scientific and Quantitative Reasoning, Critical Reading and Evaluation, and Critique an Argument can contribute to analyses of portfolios, student surveys, and other sources by helping you focus on specific areas that may benefit from improvement. Internal analyses conducted through in-depth sampling can help you generate hypotheses and develop a basis for additional research.

CLA+ can offer peer group comparisons, but the true strength of peer learning comes through collaboration. CAE facilitates cooperative relationships among CLA+ schools by encouraging the formation of consortia. Moreover, CAE hosts web conferences that periodically feature campuses engaged in promising work with CLA+.

CAE also provides workshops geared toward helping institutions maximize the utility of their Student Data Files. In these sessions, CAE researchers work with institutional staff, showing them ways to dig deeper into student results so they can answer questions about performance on CLA+ and identify areas of strength or weakness. To reserve one of these sessions for your institution, please email clateam@cae.org.

Finally, our professional development services shift the focus from assessment outcomes to pedagogical tools in Performance Task Academies. These two-day, hands-on training workshops offer faculty members guidance in the creation of their own performance tasks. Modeled on the structure of CLA+ tasks and designed to support the teaching objectives of individual courses, faculty-developed tasks can be used as classroom exercises, homework assignments, or even local-level assessments. To learn more about Performance Task Academies, please consult the Events page on the CAE website (www.cae.org).

In all these ways, we encourage institutions to explore a system of continuous improvement driven by the diagnostic potential of CLA+. When used in combination, our programs and services reinforce the belief that institutions must connect teaching, learning, and assessment in authentic and meaningful ways to strengthen and advance their students' higher-order thinking skills.

Without your contributions, CLA+ would not be on the exciting path it is on today. We thank you for your participation and look forward to your continued involvement!

# APPENDIX O: CAE BOARD OF TRUSTEES AND OFFICERS

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