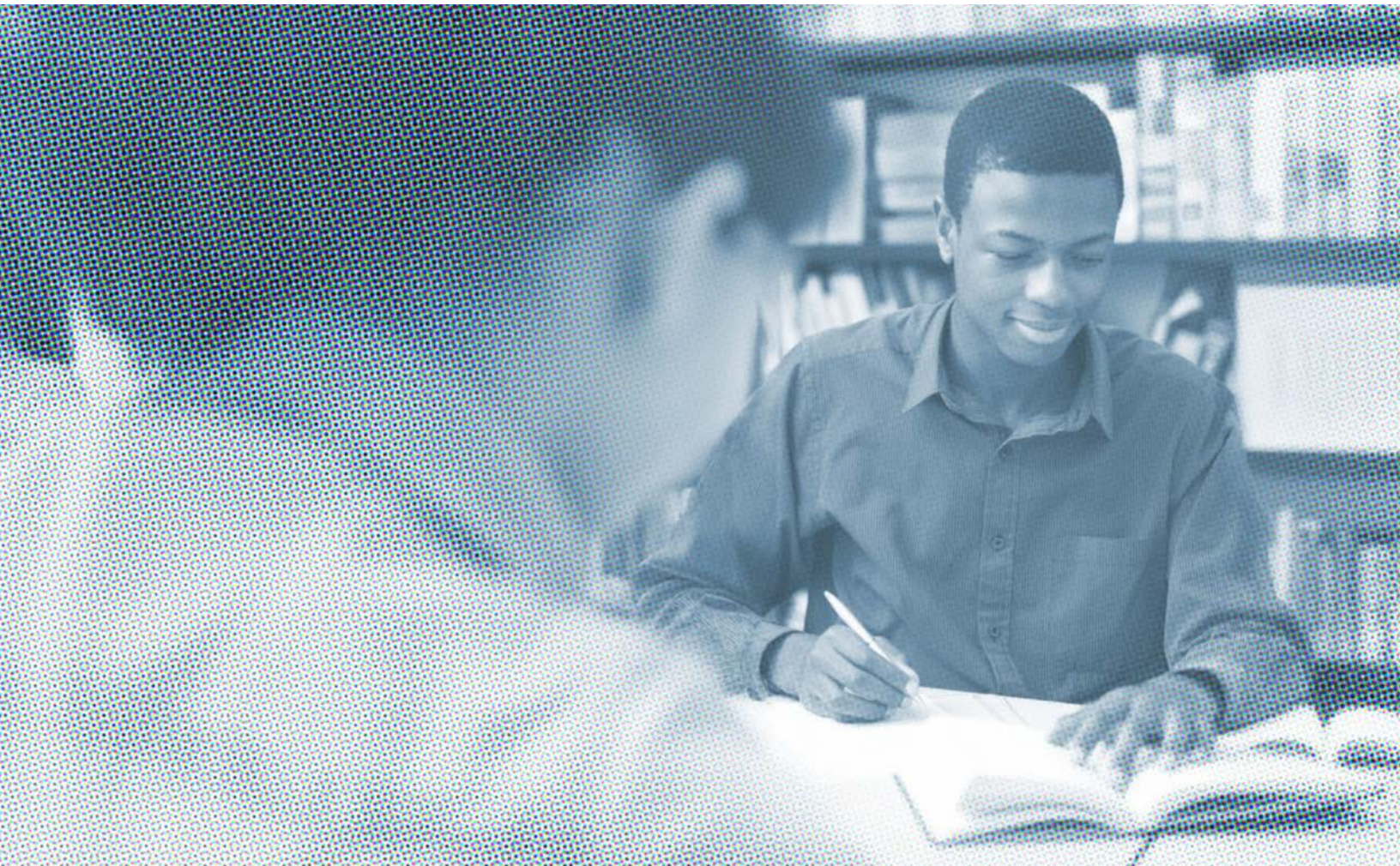
CollegeBoard

College Board National Curriculum Survey Report 2026

JUNE 2026



College Board National Curriculum Survey Report 2026

June 2026

Jim Patterson

Caitlin O'Grady

Additional Analytical Support

Michael Gosche

Trung Vong

Dona Carling

Garrett Ziegler

Suggested Citation: College Board. 2026. *College Board National Curriculum Survey Report 2026*. College Board.

About College Board

College Board reaches more than 7 million students a year, helping them navigate the path from high school to college and career. Our not-for-profit membership organization was founded more than 120 years ago. We pioneered programs like the SAT® and AP® to expand opportunities for students and help them develop the skills they need. Our BigFuture® program helps students plan for college, pay for college, and explore careers. Learn more at **cb.org**.

Contents

Executive Summary 1

College Board National Curriculum Survey Report 2026 4

1. Introduction 5

Document Preview 6

2. Methodology 7

Survey Materials 7

Survey Participants 10

Responses and Response Rate 10

3. Key Results: Skill/Knowledge Elements 18

Postsecondary Respondents 19

Surveyed Literacy Skill/Knowledge Elements 19

Additional Literacy and Literacy-Related Skill/Knowledge Elements 23

Surveyed Math Skill/Knowledge Elements 25

Additional Math and Math-Related Skill/Knowledge Elements 32

Secondary Respondents 34

Surveyed Literacy Skill/Knowledge Elements 36

Additional Literacy and Literacy-Related Skills and Knowledge 41

Surveyed Math Skill/Knowledge Elements 43

Additional Math and Math-Related Skills and Knowledge 53

Rank Ordering of Math Content Domains 54

Postsecondary and Secondary Respondent Comparisons 56

Literacy 56

Math 58

4. Additional Findings 61

Typical Allocation of Instructional Time 61

Typical Instructional Level of Identified Classes 63

Assessment of Students' College Readiness 64

Quantitative Data 64

Open-Ended Comments 67

Final Open-Ended Comments 71

5. Summary, Discussion, and Conclusion 75

Skill/Knowledge Elements 75

Postsecondary Respondents 76

Secondary Respondents 77

Rank Ordering of Math Content Domains 81

Postsecondary and Secondary Respondent Comparisons 81

Literacy 82

Math 83

Additional Findings 84

Conclusion 84

Tables

Table 1. Survey Respondents, Numbers and (Proportions), by Institutional Level and Course/Class Subject Area. 11

Table 2. Postsecondary Respondent Characteristics (Enacted Sample). 12

Table 3. Secondary Respondent Characteristics (Enacted Sample). 15

Table 4. Literacy Skill/Knowledge Elements: Postsecondary Respondents—Mean Importance Ratings and (Standard Deviations) by Element, and Grand Mean Importance Ratings and (Standard Deviations) by Content Domain..... 20

Table 5. Literacy Skill/Knowledge Elements: Postsecondary Respondents—Additional Literacy and Literacy-Related Skill/Knowledge Elements (Open-Ended Comments). 24

Table 6. Math Skill/Knowledge Elements: Postsecondary Respondents—Mean Importance Ratings and (Standard Deviations) by Element, and Grand Mean Importance Ratings and (Standard Deviations) by Content Domain..... 25

Table 7. Postsecondary Math Content Domain Grand Mean Importance Ratings and (Standard Deviations) by Overall Sample and by Math and Science Subsamples..... 32

Table 8. Math Skill/Knowledge Elements: Postsecondary Respondents—Additional Skill/Knowledge Elements (Open-Ended Comments). 32

Table 9. Literacy Skill/Knowledge Elements: Secondary Respondents—Additional Skill/Knowledge Elements (Open-Ended Comments). 41

Table 10. Math Skill/Knowledge Elements: Secondary Respondents—Additional Skill/Knowledge Elements (Open-Ended Comments). 53

Table 11. Math Content Domains: Percentages of Respondents Ranking Each Domain as Most Important (Rank 1 of 4). 55

Table 12. SAT Suite Math Section Content Domains: Distribution of Test Questions by Domain, by Testing Program(s). 55

Table 13. Literacy Skill/Knowledge: Comparison of Overall Postsecondary ELAL Sample Mean Importance Ratings and Overall Secondary ELAL Sample Taught/Not Taught Percentages. 57

Table 14. Math Skill/Knowledge Elements: Comparison of Postsecondary Math Subsample Mean Importance Ratings and Secondary (High School, Middle School/Junior High School) Math Subsample Taught/Not Taught Percentages. 59

Table 15. Literacy: Percentage of Time Allocated to Various Instructional Activities by Postsecondary Respondents..... 62

Table 16. Math: Percentage of Time Allocated to Various Instructional Activities by Postsecondary Respondents..... 62

Table 17. Literacy: Typical Instructional Level of Identified Classes. 63

Table 18. Math: Typical Instructional Level of Identified Classes. 63

Table 19. Literacy: Percentage of Students Deemed "College Ready" by Postsecondary and Secondary Respondents..... 64

Table 20. Math: Percentage of Students Deemed "College Ready" by Postsecondary and Secondary Respondents..... 64

Table 21. Literacy: Percentage of Students Deemed Able by Postsecondary and Secondary Respondents to Read an Assigned Text Independently. 66

Table 22. Math: Percentage of Students Deemed Able by Postsecondary and Secondary Respondents to Read an Assigned Text Independently. 66

Table 23. Postsecondary Respondents: College Preparedness (Open-Ended Comments). 67

Table 24. Secondary Respondents: College Preparedness (Open-Ended Comments). 69

Table 25. Postsecondary Respondents: Final Comments (Open-Ended Comments). ... 71

Table 26. Secondary Respondents: Final Comments (Open-Ended Comments). 73

Figures

Figure 1. Literacy Skill/Knowledge Elements: Postsecondary Respondents, Overall ELAL Sample—Mean Importance Ratings by Element, Ordered from Highest- to Lowest-Rated Element..... 22

Figure 2. Math Skill/Knowledge Elements: Postsecondary Respondents, Overall Math Sample—Mean Importance Ratings by Element, Ordered from Highest- to Lowest-Rated Element..... 27

Figure 3. Math Skill/Knowledge Elements, Algebra Content Domain: Postsecondary (PS)Respondents—Mean Importance Ratings by Overall Sample and by Math and Science Subsamples. 28

Figure 4. Math Skill/Knowledge Elements, Advanced Math Content Domain: Postsecondary (PS) Respondents—Mean Importance Ratings by Overall Sample and by Math and Science Subsamples..... 29

Figure 5. Math Skill/Knowledge Elements, Problem-Solving and Data Analysis Content Domain: Postsecondary (PS) Respondents—Mean Importance Ratings by Overall Sample and by Math and Science Subsamples. 30

Figure 6. Math Skill/Knowledge Elements, Geometry and Trigonometry Content Domain: Postsecondary (PS) Respondents—Mean Importance Ratings by Overall Sample and by Math and Science Subsamples. 31

Figure 7. Literacy Skill/Knowledge Elements: Secondary Respondents—Information and Ideas Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 36

Figure 8. Literacy Skill/Knowledge Elements: Secondary Respondents—Craft and Structure Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 37

Figure 9. Literacy Skill/Knowledge Elements: Secondary Respondents—Expression of Ideas Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 38

Figure 10. Literacy Skill/Knowledge Elements: Secondary Respondents—Standard English Conventions Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 39

Figure 11. Literacy Skill/Knowledge Elements: Secondary Respondents—Essay (Argument Analysis) Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 40

Figure 12. Math Skill/Knowledge Elements: High School Respondents—Algebra Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 43

Figure 13. Math Skill/Knowledge Elements: High School Respondents—Advanced Math Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 44

Figure 14. Math Skill/Knowledge Elements: High School Respondents—Problem-Solving and Data Analysis Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 45

Figure 15. Math Skill/Knowledge Elements: High School Respondents—Geometry and Trigonometry Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 46

Figure 16. Math Skill/Knowledge Elements: Middle School/Junior High School Respondents—Algebra Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 47

Figure 17. Math Skill/Knowledge Elements: Middle School/Junior High School Respondents—Advanced Math Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 48

Figure 18. Math Skill/Knowledge Elements: Middle School/Junior High School Respondents—Problem-Solving and Data Analysis Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 49

Figure 19. Math Skill/Knowledge Elements: Problem-Solving and Data Analysis Content Domain, High School (HS) and Middle School/Junior High School (MSJH) Math Subsamples—Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 50

Figure 20. Math Skill/Knowledge Elements: Middle School/Junior High School Respondents—Geometry and Trigonometry Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally. 51

Figure 21. Math Skill/Knowledge Elements: Geometry and Trigonometry Content Domain, High School (HS) and Middle School/Junior High School (MSJH) Math Subsamples—Elements Taught Formally and at What Instructional Level, or Not Taught Formally 52

Executive Summary

This College Board national curriculum survey was designed to collect validity evidence for the SAT Suite in relation to two main questions:

1. To what extent are the literacy and math skills and knowledge measured on the SAT Suite, as defined by the tests' specifications, deemed important for incoming students to have attained in order to be ready to succeed in entry-level, credit-bearing two- and four-year English, mathematics, humanities (other than English), social science, and science courses?
2. To what extent are the skills and knowledge measured on the SAT Suite being taught in middle school/junior high school mathematics and science classes and in high school English language arts, mathematics, humanities (other than English), social studies, and science classes?

With regard to question 1, the study found very strong support for the content validity of the SAT Suite's Reading and Writing and Math sections as well as the SAT Essay from postsecondary respondents.

- All surveyed **literacy skill/knowledge elements**, which compose the testing points of the SAT Suite Reading and Writing section as well as key dimensions of the SAT Essay task, were rated important by the overall postsecondary English language arts/literacy (ELAL) sample and, with one exception, by all subject area subsamples: English, humanities (other than English), social science, and science.
- All five examined **literacy content domains**, which span the SAT Suite Reading and Writing section and SAT Essay, were rated important by both the overall postsecondary ELAL sample and by each subject area subsample.
- In math, in which the surveyed **math skill/knowledge elements** similarly correspond to SAT Suite Math section testing points, all seven Algebra elements were rated important by both the overall postsecondary math sample and by the math and science subsamples, with a single exception for one subsample. All but one of the eleven Advanced Math elements were rated important by the overall

postsecondary math sample; all eleven were rated important by the postsecondary math subsample, and six of eleven were also rated important by the postsecondary science subsample. Only three of ten Problem-Solving and Data Analysis elements were rated important by the overall postsecondary math sample; however, all ten elements were rated important by the postsecondary science subsample, though only two were rated important by the postsecondary math subsample. Three of six Geometry and Trigonometry elements were rated important by the overall postsecondary math sample and by the postsecondary math subsample, while only one element was rated important by the postsecondary science subsample.

- In terms of **math content domains**, the Algebra and Advanced Math domains were rated important by both the overall postsecondary math sample and by the math and science subsamples. Problem-Solving and Data Analysis was rated important by the science subsample. Geometry and Trigonometry was rated important by both the overall postsecondary math sample and by the math subsample.

With regard to question 2, the study found strong evidence that the skill/knowledge elements in literacy and math, particularly those deemed important by postsecondary respondents (which constituted all literacy elements and most math elements), were emphasized by secondary respondents.

- In literacy, we observed generally strong secondary (high school) coverage of the Information and Ideas, Craft and Structure, Expression of Ideas, and Essay (Argument Analysis) content domains, with all skill/knowledge elements in each of those domains rated emphasized by the overall secondary ELAL sample, one or more of the subject area subsamples, or both. This wasn't the case, however, for the Standard English Conventions domain, for which all elements were "not formally taught" at rates higher than the established criterion. We attribute this outcome to two possible causes: First, the survey's requirement that these elements be *formally* taught may have excluded respondents who teach those elements opportunistically and/or on a student-by-student, assignment-by-assignment basis rather than as standalone lessons. Second, many state academic standards documents indicate that most if not all conventions-related capabilities should have been acquired by students no later than the end of middle school/junior high school.
- In math at the high school level:
  - Five of seven **Algebra** skill/knowledge elements were rated emphasized by the overall math sample, all seven by the math subsample, and two of seven by the science subsample.
  - Six of eleven **Advanced Math** elements were rated emphasized by the overall math sample, ten of eleven by the math subsample, and none by the science subsample.
  - Three of ten **Problem-Solving and Data Analysis** elements were rated emphasized by the overall math sample, four of ten by the math subsample, and three of ten by the science subsample.
  - One of six **Geometry and Trigonometry** elements was rated emphasized by the overall math sample, none by the math subsample, and one by the science subsample.

- In math at the middle school/junior high school level:
  - All seven **Algebra** elements were rated emphasized by the overall math sample and by the math subsample, and two of seven by the science subsample.
  - One of eleven **Advanced Math** elements was rated emphasized by the overall math sample and by the math subsample, and none by the science subsample.
  - Seven of ten **Problem-Solving and Data Analysis** elements were rated emphasized by the overall math sample and by the math subsample, and six of ten by the science subsample.
  - Four of six **Geometry and Trigonometry** elements were rated emphasized by the overall math sample and by the math subsample, and one of six by the science subsample.

Moreover, when we compare postsecondary and secondary responses in terms of (1) skill/knowledge elements rated important by postsecondary respondents but rated not emphasized by secondary respondents and (2) elements rated emphasized by secondary respondents but rated unimportant by postsecondary respondents, we find the following:

- In literacy:
  - (1) All twenty-nine skill/knowledge elements were rated important by the overall postsecondary ELAL sample. Of these, thirteen—ten of which were in the Standard English Conventions content domain—were rated not emphasized by the overall secondary ELAL sample.
  - (2) No elements were rated emphasized by the overall secondary ELAL sample that weren't also rated important by the overall postsecondary ELAL sample.
- In math:
  - (1) Twenty-three of thirty-four math skill/knowledge elements were rated important by the postsecondary math subsample. Of these, twenty-one were also rated emphasized by the high school math subsample, the middle school/junior high school math subsample, or both.
  - (2) Of the eleven elements rated unimportant by the postsecondary math subsample, eight were rated emphasized by the high school math subsample, the middle school/junior high school math subsample, or both. Of these eight, six were rated emphasized solely by the middle school/junior high school math subsample, suggesting that these elements are appropriately emphasized (and presumably attained) at that level and deemphasized at the high school level, in accordance with postsecondary entry expectations.

Considered together, these findings broadly and strongly support the selection of skill/knowledge elements to be tested as part of the SAT Suite's Reading and Writing and Math sections and the SAT Essay.

College Board will continue to periodically collect curriculum survey data and use these data to help guide decisions about and potential refinements to the content assessed on the SAT Suite exams. Readers of various sorts may also find these data helpful in evaluating course content and verifying sound articulation between secondary and postsecondary institutional levels. While no single source of data, including this one, should be determinative when making consequential decisions about what to teach to secondary students or what to reasonably expect from incoming postsecondary students, curriculum survey data such as those presented in this report can help inform productive discussions within academic fields and across instructional levels.

College Board National Curriculum Survey Report 2026

This report presents the results of the most recent in College Board's periodic series of surveys of the English language arts/ literacy (ELAL) and math instruction at the postsecondary and secondary school levels in the United States. The main goal of this survey (and prior surveys) is to obtain high-quality, nationally representative data about postsecondary readiness expectations and secondary instructional emphases, which College Board uses to help ensure the validity of the tests of its SAT® Suite of Assessments. These data are also potentially useful to families, educators, researchers, and policymakers seeking empirical information about what skills and knowledge students need to be ready to succeed in college and what skills and knowledge are being emphasized in secondary classrooms.

The SAT Suite

The SAT Suite is College Board's flagship college and career readiness assessment system. The suite comprises the SAT, a capstone college and career readiness assessment administered to high school juniors and seniors, as well as the PSAT/NMSQT®, PSAT™ 10, and PSAT™ 8/9 tests given to students in grades 8 through 11. Each testing program in the suite measures student attainment of essential college and career readiness prerequisites in English language arts/literacy and in math in ways appropriate to the age and attainment of the student populations. The suite's tests are highly comparable and vertically scaled, allowing for meaningful comparisons to be drawn about student achievement over time. For full details about the tests, see the *Assessment Framework for the Digital SAT Suite* (**https://satsuite.collegeboard.org/media/pdf/assessment-framework-for-digital-sat-suite.pdf**).

1. Introduction

The SAT Suite of Assessments is designed to measure students' attainment of the skills and knowledge in English language arts/ literacy and math most important for college and career readiness and success. To this end, College Board engages in an ongoing, multifaceted research process to ensure that those outcomes have been thoroughly identified and that the suite's tests validly, reliably, and fairly measure those readiness prerequisites. For students to demonstrate those competencies on the tests, they must, in turn, have had formal opportunities to acquire them during their years of schooling. College Board is therefore also interested in understanding to what extent those skill and knowledge elements are emphasized in secondary classrooms across a range of subject areas.

The present study was designed to gather validity evidence for the SAT Suite in relation to two main questions:

1. To what extent are the literacy and math skills and knowledge measured on the SAT Suite, as defined by the tests' specifications, deemed important for incoming students to have attained in order to be ready to succeed in entry-level, credit-bearing English, mathematics, humanities (other than English), social science, and science courses at two- and four-year postsecondary institutions?
2. To what extent are the skills and knowledge measured on the SAT Suite emphasized in middle school/junior high school mathematics and science classes and in high school English language arts, mathematics, humanities (other than English), social studies, and science classes?

The answer to the first question speaks directly to the validity of the SAT Suite assessments. As measures of essential college and career readiness prerequisites, the tests of the SAT Suite should assess the skills and knowledge—and only those skills and knowledge—that the best available evidence indicates are required for students to be ready to succeed in first-year, entry-level, credit-bearing college courses across a range of academic disciplines. Validation of the skills and knowledge measured in the

SAT Suite's Reading and Writing and Math sections and in the SAT Essay[1] by the very sorts of postsecondary instructors who teach such courses helps confirm that the tests measure what they're intended to measure and nothing else. The answer to the second question is also broadly important to College Board, as evidence that middle school/junior high school math teachers and high school English language arts and math teachers give significant, formal attention to those college and career readiness prerequisite skills and knowledge indicates that students have had the opportunity to learn critical competencies necessary for higher education.

In addition, survey respondents were asked a few additional questions about their perceptions of students' college and career readiness and academic achievement more generally. Members of various respondent groups were asked to indicate (1) the relative importance of several broad areas of math (e.g., algebra of linear relationships) to college and career readiness, (2) how instructional time is typically allocated to a range of literacy- and math-related activities, (3) to what extent their courses are taught on grade/course level (i.e., as designed and as described in course catalogs and the like) or below or above that level, and (4) what percentage of their students they would deem "college ready" according to their own definitions of the concept.

Document Preview

Section 2. Methodology describes the research approach College Board used in this study and describes and analyzes the respondent samples. Section 3. Key Results: Skill/Knowledge Elements details findings related to the two main research questions framing this study. Section 4. Additional Findings shares and discusses supplementary data from respondents concerning their perceptions of their students' college and career readiness and academic achievement more generally. Section 5. Summary, Discussion, and Conclusion wraps up the report, evaluates the findings, and explores implications.

[1] The SAT Essay, a direct-writing task, is administered in select states as part of statewide assessment contracts for school day testing.

2. Methodology

Survey Materials

To collect data to address the study's research questions, College Board developed a branching survey instrument administered electronically via Qualtrics, a digital survey application. Initial survey questions sought basic information about each respondent, such as their institution type (middle school/junior high school, high school, two-year college, four-year college, or none of these), their institutional role (for postsecondary respondents, full-time instructional faculty, part-time instructional faculty, graduate instructor, administrator, or none of the above; for secondary respondents, teacher, counselor, administrator, or none of the above), and whether their institution was public or private. Respondents who answered "none of these" to institution type and/or "counselor," "administrator," or "none of the above" to institutional role were thanked and routed out of the survey, as the goal was to obtain data only from active classroom instructors.

The remaining respondents were directed to differing portions of the survey instrument as warranted by the information they'd provided in the initial routing items: English/English language arts, humanities (other than English), social science/social studies, and science respondents were routed to the literacy survey portions, and math and science respondents to the math portions (meaning that science respondents were routed to both literacy and math portions). Postsecondary respondents were asked to identify the academic unit(s)—English, humanities (other than English), social science, science, and/or math—in which they'd most recently taught an introductory-level, credit-bearing course in the past three years at their current institution and, if in more than one such unit, the one in which they'd spent the majority of their teaching time or with which they were otherwise most familiar. Respondents who indicated not having taught such a course in that time period were thanked and routed out of the survey, while the remainder were asked to identify the specific content of their course (e.g., for science, whether the course was in astronomy, anatomy/physiology, biology, chemistry, computer science, Earth science, engineering, physics, or other) and the number of years they'd taught that course at their current institution and in total during their career.

Methodology Note: Limiting Respondents to Single Courses

Respondents were asked to answer most survey items in relation to a single course they'd taught or had been teaching during the last three years at their current institution. This choice was made to encourage respondents to describe the precise makeup of individual courses rather than attempt to "average" their answers with respect to their full courseload, which could be composed of widely varying requirements.

No attempt was made to obtain a particular distribution of respondents within postsecondary academic units and secondary academic departments (e.g., biology relative to physics within "science"), meaning that some course content may have been over- or underrepresented relative to the proportions of educators engaged in such teaching nationally. Findings and claims in this report thus reflect the analysis of broad academic areas (e.g., science) and not the content of specific courses within those areas (e.g., biology, physics), though table 2 (postsecondary) and table 3 (secondary) do provide those more granular breakdowns of respondents.

Secondary-level respondents were similarly asked to identify the academic department(s) in which they'd most recently taught a course in the past three years at their current institution and, if they'd taught in more than one such department, the one in which they'd spent the majority of their teaching time or with which they were otherwise most familiar. Respondents who indicated not having taught such a course in that time period were thanked and routed out of the survey, while the rest were asked for more details about their class, including the specific subject (e.g., in English, language studies/linguistics/grammar, literature, rhetoric and composition/writing, or other), number of years taught at the respondents' current school and in total during their career, the class's intended instructional level (honors/advanced, on grade level, or review/remedial), the class's length (full year or less than full year), and the grade level of the majority of students in the class (each grade, 6 through 12, as well as "other," which could, for example, be multiple grades equally).

The main section of the survey consisted of a series of items about skill/knowledge elements in either literacy or math (or, in the case of science respondents, both). These elements were drawn from the SAT Suite test specifications, as the main purpose of this study was to collect data pertinent to the validity of the SAT Suite tests. To militate against the possibility that the survey had omitted important skill/knowledge elements in literacy or math, the survey instrument provided open-ended opportunities for respondents to identify additional skills and knowledge in those areas; moreover, respondents were also given the chance to identify, via open-ended prompts, skill/knowledge elements outside of literacy or math and/or nonacademic competencies (e.g., persistence) they considered important to students' college and career readiness.

Postsecondary respondents were asked to rate each skill/knowledge element in terms of its importance as a prerequisite to students' success in the introductory-level, credit-bearing course they'd previously identified. These ratings—not at all important, not too important, somewhat important, and very important—were placed on a scale from 1 to 4, with "4" being "very important." Ratings for various respondent groups—both overall ELAL and math samples and subject area subsamples within ELAL and math—were averaged to yield *mean importance ratings* for each skill/knowledge element, and *grand mean importance ratings* for each content domain (cluster of conceptually related elements; e.g., Information and Ideas in the Reading and Writing section, Algebra in the Math section) were obtained by averaging the mean importance ratings of the individual skill/knowledge elements composing each domain. For analytical purposes, a mean or grand mean importance rating of 2.5 or higher was considered "important," while a mean or grand mean importance rating of below 2.5 was considered "unimportant."

These importance ratings prove useful in evaluating the validity of the SAT Suite because they help confirm (or disconfirm) that questions on the suite's tests measure skills and knowledge that instructors of postsecondary entry-level, credit-bearing courses consider essential prerequisites for course readiness and success. Skill/knowledge elements and content domains with importance ratings of 2.5 or higher are regarded in this report as essential for students to acquire in order to be college and career ready, while those with ratings below 2.5 are relatively (if not necessarily absolutely) less critical for students to acquire for that same purpose.

Presented with the same skill/knowledge elements, secondary respondents were asked to indicate whether each element was formally taught in the class they'd previously identified and, if formally taught, at what instructional level (taught at a remedial/review level, taught on grade level, or taught at an honors/advanced level). In this report, these data are expressed as percentages, and criteria for evaluating the data are proposed.

Such secondary-level data are useful in further confirming (or disconfirming) SAT Suite validity because while the suite's primary obligation is to test students on the skills and knowledge needed for postsecondary entry success, the tests should also reflect secondary instructional emphases whenever possible, thus ensuring that students have the appropriate opportunity to learn the capacities needed to succeed on the tests. Furthermore, any gaps identified in this analysis between secondary instruction and postsecondary readiness requirements would be of obvious importance to educators, policymakers, researchers, and the public, as they might signal misalignment between the two instructional levels.

Respondents' ratings of the literacy and math skill/knowledge elements are presented and analyzed in Section 3. Key Results: Skill/Knowledge Elements.

Depending on their backgrounds, respondents were also asked to supply additional information about teaching and learning in their identified course or class. These supplementary items addressed several areas:

- **Math content domain ranking.** Postsecondary and secondary math respondents were directed to rank order, via drag-and-drop options in Qualtrics, four broad content categories—algebra of linear relationships, algebra of nonlinear relationships, statistics and probability, and geometry and trigonometry—in terms of their relative importance for students to master in order to be considered college and career ready. These four categories align, respectively, with the four content domains sampled in the SAT Suite Math section: Algebra, Advanced Math, Problem-Solving and Data Analysis, and Geometry and Trigonometry (SAT, PSAT/NMSQT, and PSAT 10) / Geometry (PSAT 8/9). This survey item was designed to provide a general check on the proportional emphasis given to various topic areas by the SAT Suite Math specifications.
- **Typical instructional activities.** All respondents were directed to allocate 100 percent of typical instructional time in the course or class they'd identified to time spent on specific literacy- or math-related activities (e.g., in math, direct instruction or lecture, whole-class demonstration or discussion, small-group discussion, small-group investigation/lab, individual practice, individual self-paced learning, or other), as appropriate to their teaching background. (The Qualtrics platform validated individual responses by ensuring that the total added up to 100.) While not directly related to SAT Suite content validity, these items obtained information about instructional emphases complementary to that gathered from the skill/knowledge element ratings.
- **Instructional rigor level.** All respondents were asked to indicate whether the course or class they'd identified was taught primarily on course/grade level—that is, as formally described in such resources as course catalogs—or whether instruction was primarily below or above the ostensible course/grade level. These data serve

Methodology Note: "Formally Taught"

Secondary respondents were directed to consider whether each skill/knowledge element was formally taught and, if so, at what instructional level. The inclusion of "formally taught" was intended to exclude skill/knowledge elements that might come up incidentally or opportunistically as part of instruction in respondents' classes but that aren't a regular part of teaching and learning or the subject of one or more explicit lessons.

as an indicator of whether respondents believe their students are meeting course-/grade-level expectations, falling below them in terms of academic preparedness, or achieving beyond standard expectations. If, say, respondent samples or subsamples reported high rates of "below course/grade level" for the courses or classes they identified, this might suggest that students are perceived to be falling behind in their academic achievement relative to state secondary academic standards and/or postsecondary readiness expectations.

- **Academic preparedness.** All respondents were asked about their perceptions of the general academic preparedness of the students in the course or class they'd identified. The first such item queried respondents on the approximate percentage of students whom they deemed "college ready" academically, while the second item concerned the approximate percentage of students who they felt were able to read an assigned text independently and with adequate understanding. For the first item, no operational definition of "college ready" was provided, as the goal was to get an impressionistic sense of respondents' views of such readiness. The second item, which focused on independent reading ability, served as a kind of concrete follow-up by centering a common academic task that cuts across all sampled subject areas.
- **Open-ended prompts.** All respondents were given multiple open-ended opportunities to identify any important skills and knowledge not otherwise named in the survey and to provide additional insights on the academic preparedness (or lack thereof) of the students in their course or class.

Math content domain ranking data are presented and discussed in Section 3. Key Results: Skill/Knowledge Elements, while data from the other supplementary survey items are presented and analyzed in Section 4. Additional Findings.

The survey then concluded with items about the respondents themselves, including their highest education level, gender, and race/ethnicity. Findings from these items are discussed in the next subsection.

Survey Participants

RESPONSES AND RESPONSE RATE

The survey instrument for this study was designed and developed by College Board in early 2024 and, after Qualtrics programming, review, and vetting, was open for responses between mid-September 2024 and early January 2025. Participants were recruited via targeted emails sent to potential postsecondary and secondary recruits. Contact information was obtained primarily from lists acquired from vendors, meaning that these potential respondents would likely have had little to no prior association with College Board. Where necessary to ensure adequate sample and subsample sizes, College Board supplemented these vendor lists with internally generated contacts; these individuals were more likely to have had greater familiarity and association with College Board products and services. To boost response rates, reminder emails were sent, sometimes repeatedly, to initially contacted individuals.

In total, about 98,000 postsecondary instructors and about 325,000 middle school/junior high school and high school teachers in the United States were invited to participate in the survey. About four thousand postsecondary-level respondents

and about nine thousand secondary-level respondents attempted the survey (i.e., at least began it). After eliminating incomplete responses (with "incomplete" defined as responses to fewer than half the survey items), 2,271 postsecondary and 6,083 secondary surveys remained, resulting in an effective response rate of around 2 percent. Table 1 displays the breakdown of respondents, in terms of number and proportion, by institutional level (postsecondary, secondary) and by the subject area of the course or class respondents identified. All subsequent analyses are based on these enacted samples.

Table 1. **Survey Respondents, Numbers and (Proportions), by Institutional Level and Course/Class Subject Area.**

	Course/Class Subject Area				
Institutional Level	**English/English Language Arts**	**Math**	**Humanities (Other than English)**	**Social Science/ Social Studies**	**Science**
Postsecondary (*n* = 2,271)	408 (18%)	647 (28%)	543 (24%)	385 (17%)	288 (13%)
Secondary (Grades 9–12 ELAL; grades 6–12 math) (*n* = 6,083)	2,395 (39%)	2,269 (37%)	151 (2%)	442 (7%)	826 (14%)

Participant Characteristics

Table 2 summarizes the demographic attributes of respondents included in the enacted postsecondary sample. Note that the sums of various subcategories may not add up to the postsecondary sample's total *n*-count (2,271) due to omissions of responses to certain items.

Table 2. **Postsecondary Respondent Characteristics (Enacted Sample).**

Characteristic			*n**	%**
Institution Type	Public		1,547	68%
	Private		723	32%
	Four-Year		437	19%
	Two-Year		1,834	81%
Role in Institution	Full-Time Instructional Faculty		1,883	85%
	Part-Time Instructional Faculty		283	13%
	Graduate Instructor		48	2%
Academic Unit Taught In	English		408	18%
		Language Studies/Linguistics/Grammar	17	4%
		Literature	134	33%
		Rhetoric and Composition/Writing	237	59%
		Other	17	4%
	Math		647	28%
		Algebra	116	18%
		Calculus	291	45%
		Data Science	3	<1%
		Precalculus	120	19%
		Statistics	56	9%
		Trigonometry	19	3%
		Other	41	6%
	Humanities (Other than English)		543	24%
	Social Science		385	17%
		Anthropology	10	3%
		Criminal Justice/Criminology	6	2%
		Economics	47	12%
		Geography	4	1%
		History	45	12%
		Political Science/Government	111	29%
		Psychology	47	12%
		Racial/Ethnic Studies	8	2%
		Sociology	30	8%
		Gender Studies	4	1%
		Other	73	19%
	Science		288	13%
		Astronomy	1	<1%
		Anatomy/Physiology	14	5%
		Biology	112	39%
		Chemistry	38	13%
		Computer Science	46	16%
		Earth Science	14	5%
		Engineering	16	6%
		Physics	18	6%
		Other	29	10%

Table 2 (continued)

Characteristic			*n**	%**
Years Identified Course Has Been Taught	At Current Institution	Less than Five Years	236	10%
		Five to Nine Years	402	18%
		Ten to Fourteen Years	431	19%
		Fifteen Years or More	1,197	53%
	In Total	Less than Five Years	61	3%
		Five to Nine Years	162	7%
		Ten to Fourteen Years	272	12%
		Fifteen Years or More	1,749	78%
Gender	Female		973	49%
	Male		864	45%
	Nonbinary		12	1%
	Prefer Not to Respond		118	6%
Race/Ethnicity	American Indian/Alaska Native		18	1%
	Asian		119	6%
	Black/African American		89	5%
	Hispanic/Latino		108	5%
	Native Hawaiian/Pacific Islander		1	<1%
	White		1,425	72%
	Other		51	3%
	Prefer Not to Respond		220	11%

* Summed *n*-counts for subcategories may not match the category *n*-count due to minor differences in response rates.

** Percentages may not sum to 100 due to rounding.

About two-thirds (68 percent) of postsecondary respondents reported teaching at a public institution, while roughly a third (32 percent) reported teaching at a private institution. The vast majority of respondents (81 percent) indicated teaching at a two-year institution, with the remainder (19 percent) reporting teaching at a four-year institution. Most respondents (85 percent) described their role as that of full-time instructional faculty, with the remainder being part-time instructional faculty (13 percent) and graduate instructors (2 percent). The highest proportion of respondents taught math (28 percent), followed by humanities (other than English; 24 percent), English (18 percent), social science (17 percent), and science (13 percent), with the results suggesting a generally good representation of subject areas sampled. The postsecondary sample was highly experienced, with the largest proportions reporting having taught fifteen years or more at their current institution (53 percent) and in total during their career (78 percent); conversely, relatively new faculty and instructors—those reporting having taught at their current institution and in total for five years or less—made up only 10 percent and 3 percent of the sample, respectively. Postsecondary respondents who indicated their gender were roughly equally divided between female (49 percent) and male (45 percent), with 1 percent identifying as nonbinary and 6 percent electing not to respond. White respondents made up slightly more than two-thirds of the sample (72 percent), followed by Asian (6 percent), Hispanic/Latino (5 percent), Black/African American (5 percent), other (3 percent), American Indian/Alaska Native (1 percent), and Native Hawaiian/Pacific Islander (1 respondent; less than 1 percent), with 11 percent electing not to respond.

These characteristics generally compare favorably to recent national statistics concerning postsecondary instructional staff.[2] Of the approximately 1.5 million postsecondary instructional faculty members in the United States (including professors [any rank] as well as instructors and lecturers) in the fall of 2022, 63 percent reported that their institution was public, 33 percent reported that their institution was private and not for profit, and 4 percent reported that their institution was private and for profit. This accords well with the 68 percent of the enacted postsecondary respondent sample indicating working at a public institution and the 32 percent of the sample indicating working at a private institution. Nationally, approximately 56 percent of postsecondary instructional faculty were full-time and 44 percent part-time; by comparison, the postsecondary survey sample consisted of a disproportionate number of full-time instructional faculty (85 percent) relative to part-time instructional faculty (13 percent) and graduate instructors (2 percent). In terms of gender, 52 percent of postsecondary instructional faculty in fall 2022 were female, while 48 percent were male; comparatively, the enacted postsecondary respondent sample was similar at 49 percent female and 45 percent male. In terms of race/ethnicity, nationally 72 percent of postsecondary instructional faculty in fall 2022 were White, followed by Asian (13 percent), Black (7 percent), Hispanic (6 percent), two or more races (1 percent), and American Indian or Alaska Native (< 0.5 percent) and Pacific Islander (< 0.5 percent). The enacted postsecondary respondent sample closely mirrored that pattern, with White respondents composing 72 percent of the sample, followed by Asian (6 percent), Hispanic/Latino (5 percent), Black/African American (5 percent), other (3 percent), American Indian/Alaska Native (1 percent), and Native Hawaiian/Pacific Islander (1 respondent; less than 1 percent), with 11 percent electing not to respond. In general terms, the enacted postsecondary respondent sample was comparable to the fall 2022 population nationally along these dimensions, with the exception of role in institution.

Table 3 displays the demographic attributes of the secondary respondents included in the enacted sample. Note again that the sums of various subcategories may not add up to the secondary sample's total *n*-count (6,083) due to response omission.

[2] National Center for Education Statistics, "Characteristics of Postsecondary Faculty," *Condition of Education* (U.S. Department of Education, Institute of Education Sciences, 2024), **https://nces.ed.gov/programs/coe/indicator/csc**.

Table 3. **Secondary Respondent Characteristics (Enacted Sample).**

Characteristic			*n**	%**
Institution Type	Public		5,352	88%
	Private		728	12%
	Middle School/Junior High School		905	15%
	High School		5,178	85%
Academic Department Taught In	English Language Arts		2,395	39%
		Language Studies/Linguistics/Grammar	192	8%
		Literature	1,209	51%
		Rhetoric and Composition/Writing	680	28%
		Other	306	13%
	Math		2,269	37%
		Algebra	821	36%
		Calculus	353	16%
		Precalculus	339	15%
		Statistics	223	10%
		Trigonometry	51	2%
		Other	474	21%
	Humanities (Other than English)		151	2%
	Social Studies		442	7%
		Economics	10	2%
		Geography	33	7%
		History	292	66%
		Political Science/Government	32	7%
		Psychology	45	10%
		Racial/Ethnic Studies	3	1%
		Other	27	6%
	Science		826	14%
		Anatomy/Physiology	14	2%
		Biology	377	46%
		Chemistry	161	19%
		Earth Science	12	1%
		Physics	176	21%
		Other	81	10%
Years Identified Course Has Been Taught	At Current School	Less than Five Years	837	14%
		Five to Nine Years	1,208	20%
		Ten to Fourteen Years	1,177	19%
		Fifteen Years or More	2,852	47%
	In Total	Less than Five Years	133	2%
		Five to Nine Years	499	8%
		Ten to Fourteen Years	788	13%
		Fifteen Years or More	4,628	77%

Table 3 (continued)

	Characteristic	*n**	%**
Gender	Female	3,640	71%
	Male	1,366	26%
	Nonbinary	8	<1%
	Prefer Not to Respond	146	3%
Race/Ethnicity	American Indian/Alaska Native	48	1%
	Asian	170	3%
	Black/African American	194	4%
	Hispanic/Latino	284	5%
	Native Hawaiian/Pacific Islander	13	<1%
	White	4,310	83%
	Other	64	1%
	Prefer Not to Respond	282	5%

* Summed *n*-counts for subcategories may not match the category *n*-count due to minor differences in response rates.

** Percentages may not sum to 100 due to rounding.

Secondary respondents overwhelmingly reported teaching at a public institution (88 percent), with the remainder (12 percent) at a private institution. Most respondents (85 percent) reported teaching at the high school level, with the rest (15 percent) reporting teaching at a middle school or junior high school. Secondary respondents tended to teach either English language arts (39 percent) or math (37 percent), with smaller proportions reporting teaching science (14 percent), social studies (7 percent), and humanities (other than English; 2 percent). Secondary respondents were disproportionately experienced teachers, with those indicating having taught for fifteen years or more at their current institution (47 percent) and in total during their career (77 percent) making up the highest proportions of the sample; conversely, respondents reporting having taught five years or less at their current institution (14 percent) and in total (2 percent) made up the smallest proportions. About two-thirds of the secondary respondents (71 percent) were female, with 26 percent male, less than 1 percent (8 respondents) nonbinary, and 3 percent choosing not to respond. White respondents made up roughly four-fifths of the sample (83 percent), followed by Hispanic/Latino (5 percent), Black/African American (4 percent), Asian (3 percent), and American Indian/Alaska Native (1 percent); 5 percent preferred not to respond.

These characteristics, too, align well in general terms with recent statistics on the U.S. public secondary teaching workforce.[3] According to national data collected in 2020–21, a plurality of teachers at both public middle schools (essentially, grades 5–8) and public secondary/high schools (essentially, grades 9–12) had fifteen years or more of teaching experience (46.9 percent and 48.5 percent, respectively). By comparison, 77 percent of the enacted secondary respondent sample indicated having taught the course they'd identified for fifteen or more years in total. In terms of gender, national data indicated that 72.4 percent of public middle school teachers and 59.8 percent of secondary/high

[3] Soheyla Taie and Laurie Lewis, *Characteristics of 2020–21 Public and Private K–12 School Teachers in the United States: Results from the National Teacher and Principal Survey First Look* (NCES 2022-113) (U.S. Department of Education, National Center for Education Statistics, 2022), **https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2022113**.

school teachers were female; this is roughly in line with the 71 percent of the secondary respondent sample who were female. In terms of race/ethnicity, nationally 80.3 percent of public middle school teachers and 80.5 percent of public secondary/high school teachers were White, non-Hispanic, followed by Hispanic, regardless of race (8.7 percent at the middle school level, 8.4 percent at the secondary/high school level), Black or African American, non-Hispanic (6.3 percent at both levels), Asian (2.4 percent, 2.3 percent), two or more races (1.7 percent at both levels), American Indian or Alaska Native (0.5 percent at both levels), and Native Hawaiian or Other Pacific Islander (0.1 percent, 0.3 percent). The race/ethnicity demographics of the enacted secondary respondent sample are similar, with White teachers composing 83 percent of the sample, Hispanic/Latino teachers 5 percent, Black/African American teachers 4 percent, Asian teachers 3 percent, American Indian/Alaska Native teachers 1 percent, teachers of other races/ethnicities 1 percent, and Native Hawaiian/Pacific Islander teachers less than 1 percent (13 respondents), with 5 percent preferring not to respond.

Based on the above profiles of the enacted postsecondary and secondary respondent samples and comparisons with national data, it's reasonable to conclude that the enacted samples are broadly representative of the U.S. postsecondary and secondary teaching forces on the examined characteristics.

3. Key Results: Skill/Knowledge Elements

This section focuses on the central findings of this study, which pertain to the ratings assigned by postsecondary and secondary respondents to lists of skill/knowledge elements in the literacy and math domains. Section 4. Additional Findings addresses data obtained from supplementary survey items covering other topics.

The chief data source for this section is the ratings assigned to various skill/knowledge elements in literacy and math by postsecondary instructors and secondary teachers. These elements were drawn from the specifications for the Reading and Writing and Math sections of the SAT Suite tests as well as those for the SAT Essay, as the main purpose of conducting the survey was to collect evidence pertinent to the content validity of the SAT Suite—specifically, evidence as to whether the SAT Suite tests measure skills and knowledge important to the literacy and math constructs represented (and nothing else). Postsecondary respondents' ratings are discussed first, followed by secondary respondents' ratings; within the reporting of each institutional level's ratings, literacy skill/knowledge elements are discussed first, followed by math elements.

Postsecondary respondents were asked to rate, on a four-point scale, each of numerous skill/knowledge elements in terms of its importance as a college and career readiness prerequisite, with "4" being "very important," "3" being "somewhat important," "2" being "not too important," and "1" being "not important." Results were averaged and are reported out by overall postsecondary ELAL and math samples and by subject area subsamples: English, humanities (other than English), social science, and science for the literacy elements; math and science for the math elements. Individuals' responses were averaged to attain *mean importance ratings* for each skill/knowledge element; given that each element was also part of a larger content domain, or conceptual cluster, mean

importance ratings for associated elements were themselves averaged, yielding *grand mean importance ratings* by domain (e.g., Information and Ideas in literacy; Algebra in math). The data in this section are displayed in both tabular and graphical forms.

Mean and grand mean importance ratings of 2.5 or higher are interpreted in this report as indications that a given element or content domain is "important," while mean and grand mean importance ratings of less than 2.5 are interpreted as indications that the element or domain is "unimportant." "Important" and "unimportant" should be interpreted in relative rather than absolute terms: in other words, a low-rated element may be fairly thought of as less important than a higher-rated one, but even the lowest-rated elements may have importance in some educational contexts.

Secondary respondents were asked to evaluate the same skill/knowledge elements as were the postsecondary respondents. The former, however, were directed to consider these elements in terms of whether each element was formally taught in the class they'd identified and, if formally taught, at which instructional rigor level the element was primarily taught: at an advanced/honors level, on grade level, or at a remedial/review level. These results were averaged across the overall secondary ELAL and math samples and subject area subsamples: English language arts, humanities (other than English), social studies, and science for the literacy elements; math and science for the math elements. Math results, which included data from both middle school/junior high school teachers and high school teachers, were further subdivided by institutional level to yield more clarity, given that the combined span would have covered roughly seven grade levels.

Secondary respondent data are expressed as percentages. Criteria for analyzing these percentages are proposed and implemented below.

Postsecondary Respondents

SURVEYED LITERACY SKILL/KNOWLEDGE ELEMENTS

Table 4 presents the mean and grand mean importance ratings and standard deviations derived from an analysis of postsecondary respondents' ratings of the literacy skill/knowledge elements about which they were surveyed. Mean and grand mean importance ratings are supplied for the full postsecondary ELAL sample ("overall") and for each subject area subsample (English, humanities [other than English], social science, and science). Cells in the table with values of 2.5 or greater are shaded in blue and further designated with a checkmark (✓), denoting "important" skill/knowledge elements or content domains; cells with values of less than 2.5 are shaded in orange and further designated with an "x" (✘), denoting "unimportant" skill/knowledge elements or content domains.

In the SAT Suite Reading and Writing section, individual literacy skill/knowledge elements are conceptually organized into four content domains: Information and Ideas, Craft and Structure, Expression of Ideas, and Standard English Conventions. A fifth content domain represented on the survey reflects aspects of direct writing as assessed by the SAT Essay, a source-based argument analysis task administered in some states as part of SAT School Day testing.

Methodology Note: Ratings Versus Percentages

In statistical terms, it would've been possible to present secondary results as ratings instead of percentages. The authors elected not to do that because it would've implied direct comparability between postsecondary and secondary results, which isn't the case given that postsecondary respondents were asked to rate skill/knowledge elements in terms of their value as prerequisites for their courses, whereas secondary respondents were asked to consider the elements in terms of instruction in their own classes.

Interpretation Note: College Readiness Prerequisites

While "important" ratings from postsecondary respondents suggest skill/knowledge elements that students must acquire prior to successful college entry, "unimportant" ratings are more ambiguous. They may indicate relative devaluing of a particular element, but they may also suggest that given elements are still important but aren't considered postsecondary entry requirements. In other words, postsecondary instructors may well teach some of these elements as part of their identified courses rather than expect students to already have attained them. The safest interpretation is that lower-rated elements are relatively, rather than absolutely, less important than higher-rated ones.

Table 4. **Literacy Skill/Knowledge Elements: Postsecondary Respondents—Mean Importance Ratings and (Standard Deviations) by Element, and Grand Mean Importance Ratings and (Standard Deviations) by Content Domain.**

	Mean Importance Rating (Standard Deviation)				
Skill/Knowledge Element	**Overall**	**English**	**Humanities (Other than English)**	**Social Science**	**Science**
Information and Ideas	*n* = 1,439*	*n* = 359*	*n* = 466*	*n* = 342*	*n* = 272*
Read closely to identify information and ideas stated explicitly in a text	3.8 (0.5) ✓	3.8 (0.4) ✓	3.8 (0.5) ✓	3.8 (0.5) ✓	3.7 (0.5) ✓
Read closely to draw reasonable inferences and conclusions from a text	3.7 (0.6) ✓	3.8 (0.5) ✓	3.7 (0.5) ✓	3.7 (0.5) ✓	3.6 (0.6) ✓
Determine main ideas, central claims, or themes in a text	3.8 (0.5) ✓	3.8 (0.4) ✓	3.8 (0.5) ✓	3.7 (0.5) ✓	3.5 (0.7) ✓
Determine the textual evidence (e.g., quotation, finding) that best supports a given claim or point	3.5 (0.7) ✓	3.7 (0.5) ✓	3.6 (0.6) ✓	3.4 (0.7) ✓	3.1 (0.9) ✓
Determine the quantitative evidence from a data display (e.g., graph, table) that most strongly supports, weakens, or illustrates a claim, hypothesis, or point presented in a text	3.0 (1.0) ✓	2.6 (1.0) ✓	2.8 (1.0) ✓	3.3 (0.8) ✓	3.7 (0.6) ✓
Information and Ideas Grand Mean Importance Rating	3.6 (0.3) ✓	3.5 (0.5) ✓	3.5 (0.4) ✓	3.6 (0.3) ✓	3.5(0.3) ✓
Craft and Structure	*n* = 1,439	*n* = 359	*n* = 466	*n* = 342	*n* = 272
Determine the meaning of high-utility academic words and phrases in context	3.1 (0.8) ✓	3.0 (0.8) ✓	3.1 (0.9) ✓	3.0 (0.8) ✓	3.2 (0.8) ✓
Accurately and precisely use high-utility academic words and phrases in text	2.9 (0.8) ✓	2.8 (0.8) ✓	2.9 (0.9) ✓	2.8 (0.8) ✓	3.0 (0.8) ✓
Understand how information in a text is organized (e.g., observation-hypothesis-test-conclusion) or how a text is structured (e.g., extended comparison)	3.3 (0.8) ✓	3.3 (0.7) ✓	3.4 (0.7) ✓	3.2 (0.8) ✓	3.2 (0.8) ✓
Analyze the purpose of part of a text (e.g., sentence, paragraph) in relation to the text as a whole	3.3 (0.8) ✓	3.5 (0.6) ✓	3.4 (0.8) ✓	3.2 (0.8) ✓	3.0 (0.9) ✓
Determine the overall purpose of a text	3.6 (0.7) ✓	3.7 (0.5) ✓	3.8 (0.5) ✓	3.5 (0.7) ✓	3.4 (0.8) ✓
Determine the point of view or the position that the author of a text is taking	3.4 (0.8) ✓	3.7 (0.6) ✓	3.6 (0.7) ✓	3.4 (0.8) ✓	2.8 (1.0) ✓
Synthesize information and ideas from multiple topically related texts	3.3 (0.8) ✓	3.3 (0.7) ✓	3.5 (0.7) ✓	3.3 (0.7) ✓	3.2 (0.9) ✓
Craft and Structure Grand Mean Importance Rating	3.3 (0.3) ✓	3.3 (0.3) ✓	3.4 (0.3) ✓	3.2 (0.3) ✓	3.1 (0.3) ✓
Expression of Ideas	*n* = 1,439	*n* = 359	*n* = 466	*n* = 342	*n* = 272
Arrange words, phrases, and clauses in various ways to achieve different purposes (e.g., to stress a similarity or difference)	3.1 (0.8) ✓	3.2 (0.7) ✓	3.3 (0.8) ✓	3.0 (0.9) ✓	2.8 (0.9) ✓
Use logical and effective transition words, phrases, and sentences to enhance text cohesion	3.3 (0.8) ✓	3.4 (0.7) ✓	3.5 (0.7) ✓	3.1 (0.8) ✓	2.9 (1.0) ✓
Expression of Ideas Grand Mean Importance Rating	3.2 (0.6) ✓	3.3 (0.5) ✓	3.4 (0.5) ✓	3.1 (0.6) ✓	2.9 (0.7) ✓

Table 4 (continued)

Skill/Knowledge Element	Mean Importance Rating (Standard Deviation) Overall	English	Humanities (Other than English)	Social Science	Science
Standard English Conventions**	*n* = 1,439	*n* = 359	*n* = 466	*n* = 342	*n* = 272
Use contextually appropriate punctuation to mark the end of a sentence	3.4 (0.8) ✓	3.6 (0.6) ✓	3.6 (0.6) ✓	3.3 (0.8) ✓	3.0 (1.0) ✓
Properly punctuate lists and clauses within sentences, including the appropriate use of conjunctions (e.g., "and") and conjunctive adverbs (e.g., "however")	3.2 (0.8) ✓	3.3 (0.7) ✓	3.3 (0.7) ✓	3.1 (0.9) ✓	2.8 (1.0) ✓
Incorporate supplementary information in a sentence (e.g., parentheticals) using appropriate punctuation	2.9 (0.9) ✓	3.1 (0.8) ✓	3.1 (0.8) ✓	2.9 (0.9) ✓	2.7 (0.9) ✓
Avoid unnecessary punctuation (e.g., "animals that eat only plants are herbivores" vs. "animals, that eat only plants are herbivores")	2.9 (0.9) ✓	3.0 (0.8) ✓	3.1 (0.8) ✓	2.9 (0.9) ✓	2.6 (1.0) ✓
Ensure agreement in number between a subject and a verb (e.g., "dogs are mammals" vs. "dogs is mammals")	3.4 (0.8) ✓	3.5 (0.7) ✓	3.6 (0.7) ✓	3.3 (0.9) ✓	3.0 (1.0) ✓
Use verbs and verbals (gerunds, participles, infinitives) in contextually appropriate ways (e.g., "the lawyer was confident of winning the case" vs. "the lawyer was confident of win the case")	3.3 (0.8) ✓	3.4 (0.7) ✓	3.5 (0.7) ✓	3.3 (0.8) ✓	2.9 (1.0) ✓
Use contextually appropriate verb tenses and aspects (e.g., "Neanderthals went extinct around 40,000 years ago" vs. "Neanderthals will go extinct around 40,000 years ago")	3.4 (0.8) ✓	3.5 (0.7) ✓	3.6 (0.7) ✓	3.3 (0.8) ✓	3.0 (0.9) ✓
Modify sentence elements appropriately and logically (e.g., "Congress approved small raises for soldiers" vs. "Congress approved raises for soldiers that are small")	3.3 (0.8) ✓	3.3 (0.7) ✓	3.5 (0.7) ✓	3.2 (0.8) ✓	2.9 (0.9) ✓
Distinguish among and make contextually appropriate use of singular, plural, singular possessive, and plural possessive nouns and pronouns (e.g., "Venus has a high proportion of carbon dioxide in its atmosphere" vs. "Venus has a high proportion of carbon dioxide in their atmosphere")	3.3 (0.8) ✓	3.3 (0.7) ✓	3.5 (0.7) ✓	3.2 (0.9) ✓	2.9 (1.0) ✓
Distinguish among and make contextually appropriate use of similarly formed possessive determiners ("its," "their," "your"), contractions ("it's," "they're," "you're), and adverbs ("there")	3.3 (0.8) ✓	3.4 (0.8) ✓	3.5 (0.7) ✓	3.2 (0.9) ✓	2.9 (1.0) ✓
Standard English Conventions Grand Mean Importance Rating	3.2 (0.3) ✓	3.3 (0.2) ✓	3.4 (0.2) ✓	3.2 (0.3) ✓	2.9 (0.3) ✓
Essay (Argument Analysis)	*n* = 1,439	*n* = 359	*n* = 466	*n* = 342	*n* = 272
Analyze arguments to assess how an author uses or fails to use evidence, such as facts or examples, to support claims	3.3 (0.8) ✓	3.4 (0.7) ✓	3.4 (0.8) ✓	3.4 (0.7) ✓	3.1 (1.0) ✓
Analyze arguments to assess how an author uses or fails to use logical reasoning to develop ideas and to connect claims and evidence	3.3 (0.8) ✓	3.3 (0.7) ✓	3.4 (0.8) ✓	3.2 (0.8) ✓	3.0 (1.0) ✓
Analyze arguments to assess how an author uses or fails to use stylistic and/or persuasive elements, such as word choice or appeals to emotion, to add power to the author's ideas	2.9 (0.9) ✓	3.2 (0.8) ✓	3.1 (0.9) ✓	2.8 (0.9) ✓	2.4 (1.0) ✘
Produce writing that develops a logical argument by supporting a claim with cogent reasoning and relevant and sufficient evidence	3.5 (0.7) ✓	3.6 (0.6) ✓	3.6 (0.7) ✓	3.5 (0.7) ✓	3.2 (0.8) ✓
Produce writing that informs the reader or explains a concept, process, or the like using relevant and sufficient detail	3.5 (0.7) ✓	3.5 (0.7) ✓	3.5 (0.7) ✓	3.5 (0.7) ✓	3.3 (0.8) ✓
Essay (Argument Analysis) Grand Mean Importance Rating	3.3 (0.3) ✓	3.4 (0.3) ✓	3.4 (0.4) ✓	3.3 (0.3) ✓	3.0 (0.4) ✓

* The listed *n*-counts represent the fewest number of respondents who addressed the relevant survey items.

** The item "Ensure agreement between a pronoun and its antecedent," an SAT Suite testing point within the Standard English Conventions domain, was inadvertently left off the survey.

For ease of interpretation, figure 1 displays the results for the overall postsecondary ELAL sample in graphical form. Figure 1 orders the surveyed literacy skill/knowledge elements from highest rated to lowest. The "important" threshold of 2.5 is marked by a vertical dotted line. Note that the names of the skill/knowledge elements have been truncated slightly for easier display here.

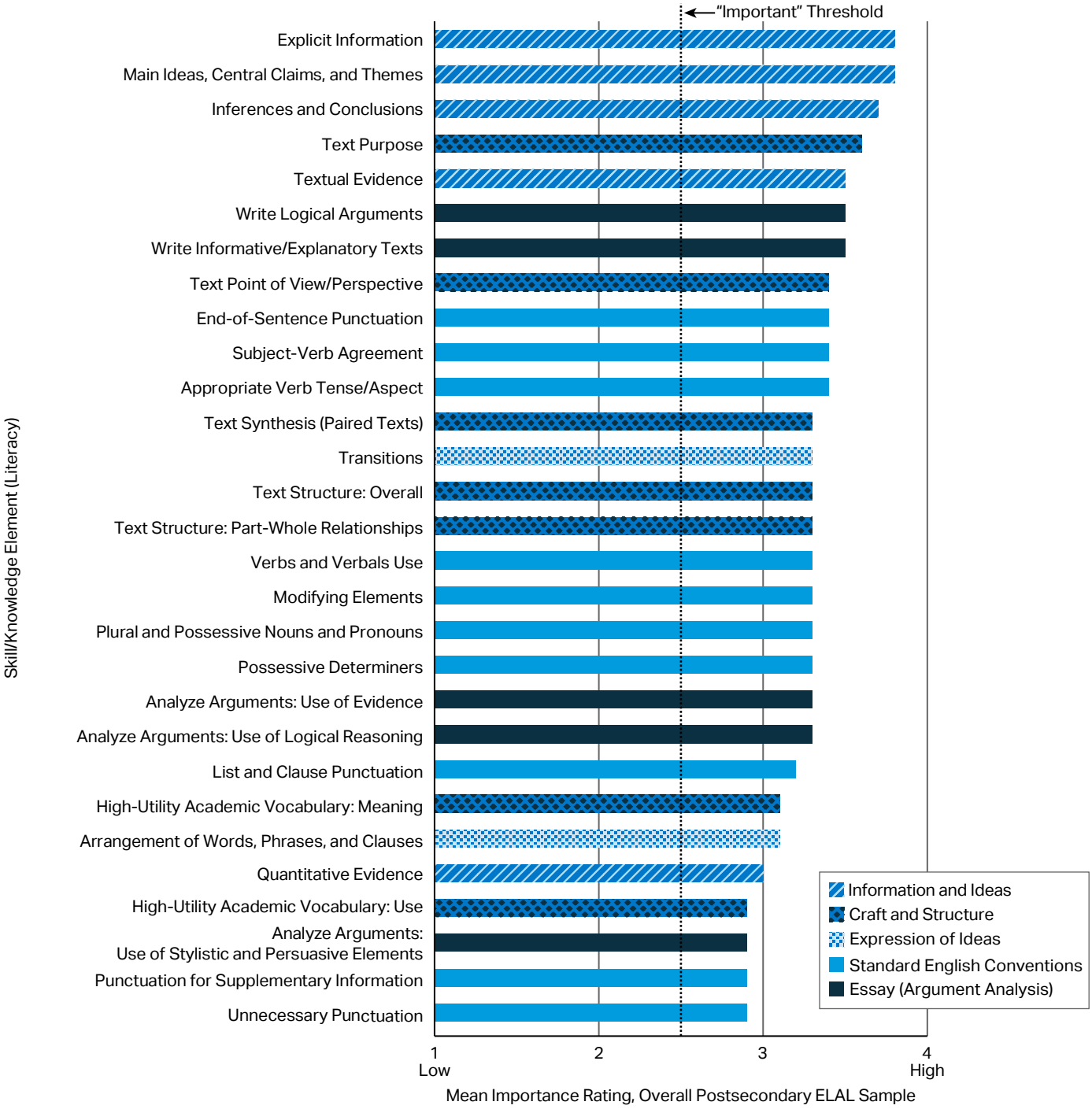


Figure 1. **Literacy Skill/Knowledge Elements: Postsecondary Respondents, Overall ELAL Sample—Mean Importance Ratings by Element, Ordered from Highest- to Lowest-Rated Element.**

With a single exception, all literacy skill/knowledge elements were rated important by both the overall postsecondary ELAL sample and by each subject area subsample. The sole exception was "Analyze Arguments: Use of Stylistic and Persuasive Elements" in the Essay (Argument Analysis) content domain. This element was rated as important by the overall postsecondary ELAL sample and by the English, humanities (other than English), and social science subsamples but just missed the "important" cutoff for the science subsample (2.4).

The grand mean importance ratings for the five literacy content domains met the 2.5 "important" threshold from both the overall postsecondary ELAL sample and from each subject area subsample.

Given that all these skill/knowledge elements are measured as part of the SAT Suite Reading and Writing section and/or the SAT Essay, these postsecondary findings provide strong validity evidence for the SAT Suite's literacy components.

ADDITIONAL LITERACY AND LITERACY-RELATED SKILL/KNOWLEDGE ELEMENTS

Respondents had multiple opportunities to provide open-ended comments as part of the survey. In one such opportunity, postsecondary ELAL respondents were prompted to supply any additional literacy or literacy-related skills and knowledge that they felt students should already have acquired in order to be college ready. The report authors expected that this opportunity would both reaffirm the importance of certain skill/knowledge elements already formally included in the survey and elicit others not specifically singled out there but that would potentially contribute to a well-rounded literacy education. (Recall that, by design, the survey's literacy [and math] skill/knowledge elements addressed only content presently measured by the SAT Suite tests.) We also assumed that these data could be useful in identifying elements potentially to include in future curriculum surveys.

Given the high volume and heterogeneous nature of the open-ended comments received from this and similar items discussed subsequently in the report, a generative AI tool, ChatGPT 5 Pro, was prompted to categorize the comments conceptually by content, using up to three codes per comment if appropriate. The resultant coding scheme was reviewed for cohesion and comprehensibility by the lead author, and ChatGPT's suggestions for illustrative comments were vetted for category match. ChatGPT's initial coding processes left numerous "uncategorized" comments, which were hand-coded by College Board subject matter experts into the existing category structure—expanded as warranted—and fed back into ChatGPT for updated counts, with some comments still left uncategorized. Because of the likelihood that ChatGPT categorized some comments differently than experienced human coders would have, the counts listed in table 5 and similar tables of open-ended comments should be considered heuristic and directional rather than precise. Some of the sample comments below and elsewhere have been edited slightly for clarity, length, or formatting. Note that the remaining "uncategorized" comments include substantial numbers of "n/a" and the like.

Table 5 provides an overview of these comments, including the conceptual categories into which comments fell, operational definitions for the categories, the approximate number of comments (frequency; "Freq") in the categories, and illustrative samples of those comments.

Table 5. **Literacy Skill/Knowledge Elements: Postsecondary Respondents—Additional Literacy and Literacy-Related Skill/Knowledge Elements (Open-Ended Comments).**

Category	Operational Definition	Freq	Illustrative Comments
Reading Comprehension	Understanding, interpreting, and analyzing texts, including close reading and evidence-based interpretation	295	"Phonemic awareness." – 4-year college, science "Be able to pick up on subtle information revealed in a text." – 4-year college, English
Writing Skills and Composition	Producing clear, organized writing, including thesis development, argumentation, coherence, and revision	230	"How and when to use paragraphs." – 4-year college, humanities (other than English) "It is crucial to be able to write clearly and concisely." – 4-year college, social science
Research and Information Literacy	Locating, evaluating, integrating, and citing sources ethically and effectively, including media literacy	125	"Appropriate/accurate formal citing. Interpreting maps at various scales." – 4-year college, social science "I have to teach all of the following to my students at the cost of content—they do not know how to do this stuff: Using basic functions of all major productivity software suites such as MS Office (Word, Excel, PowerPoint in particular), including how to save files as PDF[s]; how to save and re-access files on a personal device like a laptop; the difference between cloud-based apps and local apps; the difference between local and cloud storage; basic electronic data/file management (keeping materials organized in folders, naming files, etc.)." – 4-year college, science
Grammar and Mechanics	Control of sentence structure punctuation, capitalization, spelling, and usage	115	"Difference between *to*, *two*, and *too*; *it is* and *its*; *where* and *were*; *there* and *their* and *they are*; *then* and *than*; *your* and *you are*; *whose*, *who is*." – 4-year college, humanities "Distinguishing between directives that indicate required actions vs. those that indicate preferred actions (which can both be given with the same model, e.g., 'You *should* write')." – 4-year college, humanities
Critical Thinking and Analysis	Applying logical reasoning to evaluate arguments, synthesize ideas, and make evidence-based judgments	92	"Organizing thoughts, making arguments, logical thinking." – 4-year college, humanities "Creative, divergent thinking." – 4-year college, humanities
Study Skills and Habits	Time management, note-taking, organization, persistence, and other self-regulation strategies that support learning	70	"Students need to be able to follow instructions and to be held accountable for the work they turn in. Doing the work is key." – 4-year college, English "Students should know how to focus on the lesson at hand and to pay attention to detail." – 2-year college, English
Oral Communication and Presentation	Preparing and delivering spoken communication, including discussion and presentation skills	38	"Essay organization (use of paragraphs to organize main points). Note-taking. Discussion participation as essential, not optional, for understanding." – 4-year college, humanities "Listening skills similar to reading skills as described." – 4-year college, humanities

Table 5 (continued)

Category	Operational Definition	Freq	Illustrative Comments
Quantitative and Visual Literacy	Reading, interpreting, and integrating quantitative or visual information, such as graphs, charts, tables, and figures, into reading and writing tasks	32	"Basic arithmetic is crucial. They also need to be able to talk about tables and graphs." – 4-year college, social science "If they are literate enough to make it into our university, then they are literate enough to succeed in my class. Where they have trouble is with data and especially graphs." – 4-year college, social science
Vocabulary and Academic Language	Knowledge and use of general academic and discipline-specific vocabulary	22	"Since I teach linguistics, where distinctions like *well-formed* vs. *ill-formed*, *acceptable* vs. *unacceptable*, *anomalous* vs. *sensible* as applied to words, phrases, and sentences constitute key data, these skills are crucial." – 4-year college, social science "Describe verbally abstract concepts in a meaningful (and possibly visual) way." – 4-year college, science
Uncategorized	Comments too vague, idiosyncratic, or not clearly aligned to the categories above	83	

As indicated in table 5, feedback related to "reading comprehension" and "writing skills and composition" accounted for a disproportionate number of the comments. While most categories represent skill/knowledge areas that were already formally included in the survey, those related to "research and information literacy," "study skills and habits," and "oral communication and presentation" were new inclusions reflective of the fact that respondents often took the opportunity to describe elements not tested on the SAT Suite Reading and Writing section or by the SAT Essay but that, in their view, contributed to a well-rounded literacy education.

SURVEYED MATH SKILL/KNOWLEDGE ELEMENTS

Table 6 presents the mean importance ratings and standard deviations derived from an analysis of postsecondary respondents' evaluations of the math skill/knowledge elements as well as grand mean importance ratings and standard deviations by content domain.

Table 6. **Math Skill/Knowledge Elements: Postsecondary Respondents—Mean Importance Ratings and (Standard Deviations) by Element, and Grand Mean Importance Ratings and (Standard Deviations) by Content Domain.**

	Mean Importance Rating (Standard Deviation)		
Skill/Knowledge Element	Overall	Math	Science
Algebra	*n* = 844*	*n* = 581*	*n* = 263*
Interpret variables, constants, and terms in a linear equation	3.7 (0.7) ✓	3.8 (0.5) ✓	3.4 (0.9) ✓
Solve a linear equation	3.6 (0.8) ✓	3.8 (0.5) ✓	3.2 (1.0) ✓
Solve a system of two linear equations	2.9 (1.1) ✓	3.1 (1.0) ✓	2.5 (1.1) ✓
Graph a linear equation	3.6 (0.7) ✓	3.8 (0.6) ✓	3.3 (0.9) ✓
Graph a system of two linear equations or inequalities	2.6 (1.1) ✓	2.7 (1.0) ✓	2.4 (1.1) ✘
Represent contexts using one or more linear expressions, equations, or inequalities	3.2 (0.9) ✓	3.4 (0.8) ✓	2.8 (1.0) ✓
Use and interpret function notation	3.3 (1.0) ✓	3.6 (0.8) ✓	2.7 (1.1) ✓
Algebra Grand Mean Importance Rating	3.3 (0.4) ✓	3.5 (0.4) ✓	2.9 (0.4) ✓

Table 6 (continued)

Skill/Knowledge Element	Mean Importance Rating (Standard Deviation) Overall	Math	Science
Advanced Math	*n* = 844	*n* = 581	*n* = 263
Interpret variables, constants, and terms in a quadratic or exponential equation	3.3 (0.9) ✓	3.5 (0.8) ✓	2.9 (1.0) ✓
Add, subtract, and multiply polynomials	3.3 (1.0) ✓	3.6 (0.8) ✓	2.8 (1.1) ✓
Factor polynomials	3.1 (1.1) ✓	3.5 (0.9) ✓	2.4 (1.0) ✘
Solve a quadratic equation	3.1 (1.0) ✓	3.5 (0.9) ✓	2.6 (1.1) ✓
Solve a rational or radical equation	2.9 (1.0) ✓	3.1 (0.9) ✓	2.4 (1.1) ✘
Solve a system of one linear equation and one nonlinear equation	2.4 (1.1) ✘	2.5 (1.1) ✓	2.2 (1.0) ✘
Graph a polynomial equation	2.9 (1.0) ✓	3.0 (1.0) ✓	2.6 (1.1) ✓
Graph an exponential equation	2.9 (1.1) ✓	3.0 (1.0) ✓	2.7 (1.1) ✓
Represent contexts using a quadratic or exponential equation	2.8 (1.0) ✓	3.0 (1.0) ✓	2.4 (1.1) ✘
Choose and produce equivalent forms of a quadratic or exponential equation	2.6 (1.1) ✓	2.8 (1.0) ✓	2.2 (1.0) ✘
Isolate one variable in terms of other variables in an equation	3.5 (0.9) ✓	3.7 (0.7) ✓	3.0 (1.1) ✓
Advanced Math Grand Mean Importance Rating	3.0 (0.3) ✓	3.2 (0.3) ✓	2.6 (0.3) ✓
Problem-Solving and Data Analysis	*n* = 844	*n* = 581	*n* = 263
Solve problems using percentages, proportional relationships, ratios, rates, and units	3.3 (0.8) ✓	3.2 (0.8) ✓	3.5 (0.8) ✓
Identify and distinguish between linear and exponential growth	3.1 (1.0) ✓	3.0 (1.0) ✓	3.2 (0.9) ✓
Read and interpret statistical graphs	2.6 (1.1) ✓	2.3 (1.1) ✘	3.3 (0.8) ✓
Given a scatterplot, model statistical data with a linear function	2.3 (1.1) ✘	2.1 (1.1) ✘	2.9 (1.0) ✓
Solve problems using measures of center, including mean, median, and mode	2.3 (1.2) ✘	1.9 (1.1) ✘	3.1 (0.9) ✓
Solve problems using measures of spread, including range and standard deviation	2.1 (1.1) ✘	1.8 (1.0) ✘	2.9 (1.0) ✓
Solve problems using probability	2.1 (1.1) ✘	1.8 (1.0) ✘	2.8 (1.0) ✓
Solve problems using sample statistics and population parameters	2.0 (1.1) ✘	1.7 (1.0) ✘	2.6 (1.0) ✓
Understand the characteristics of well-designed studies, including the role of randomization	2.0 (1.1) ✘	1.7 (1.0) ✘	2.9 (1.0) ✓
Interpret margin of error	2.0 (1.1) ✘	1.7 (1.0) ✘	2.8 (1.0) ✓
Problem-Solving and Data Analysis Grand Mean Importance Rating	2.4 (0.5) ✘	2.1 (0.6) ✘	3.0 (0.3) ✓
Geometry and Trigonometry	*n* = 844	*n* = 581	*n* = 263
Solve problems using perimeter, area, and volume formulas	3.0 (1.0) ✓	3.1 (0.9) ✓	2.7 (1.1) ✓
Solve problems involving angle and line theorems	2.4 (1.1) ✘	2.4 (1.1) ✘	2.2 (1.1) ✘
Solve problems using triangle similarity and congruence theorems	2.3 (1.1) ✘	2.4 (1.1) ✘	2.1 (1.0) ✘
Solve problems using the Pythagorean theorem and the properties of special right triangles	2.8 (1.2) ✓	3.1 (1.1) ✓	2.2 (1.1) ✘
Solve problems using sine, cosine, and tangent ratios	2.6 (1.3) ✓	2.8 (1.3) ✓	2.2 (1.1) ✘
Solve problems using circle theorems	2.2 (1.1) ✘	2.3 (1.1) ✘	2.0 (1.0) ✘
Geometry and Trigonometry Grand Mean Importance Rating	2.6 (0.4) ✓	2.7 (0.4) ✓	2.2 (0.4) ✘

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 2 orders the overall postsecondary math sample's responses to the math skill/knowledge elements by decreasing mean importance rating. The names of the skill/knowledge elements have again been truncated for readability, the same vertical dotted line marking the "important" threshold (2.5) appears, and orange shading further highlights elements that fell below the "important" threshold.

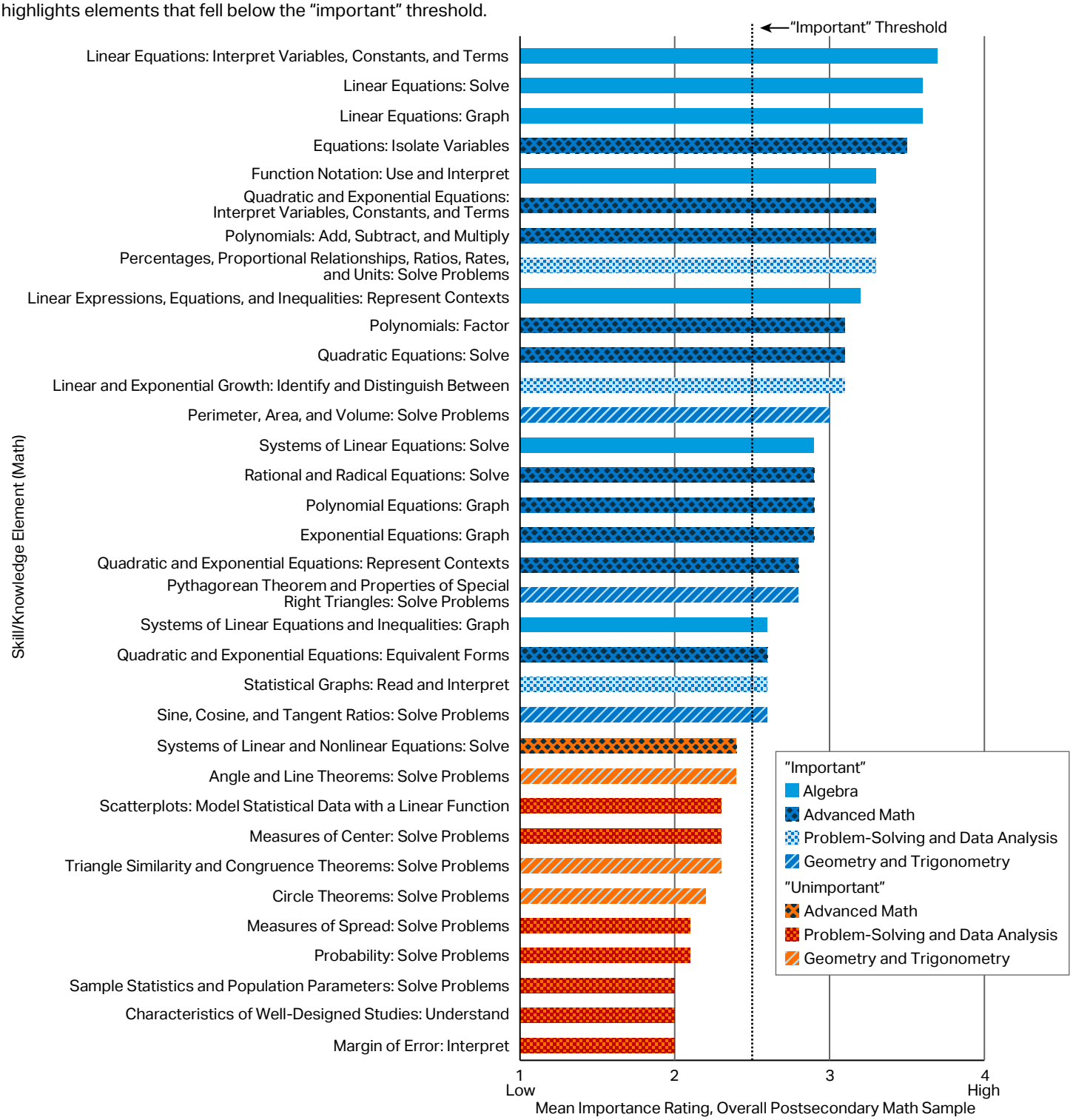


Figure 2. **Math Skill/Knowledge Elements: Postsecondary Respondents, Overall Math Sample—Mean Importance Ratings by Element, Ordered from Highest- to Lowest-Rated Element.**

Interpretation Note: Comparing Literacy and Math Results

In drawing comparisons between literacy and math results, readers should keep in mind the differences between both the nature of the skill/knowledge elements in each domain and the academic disciplines themselves. The literacy elements are generally broad-based competencies frequently taught throughout the secondary (and elementary) curriculum and widely applicable in a range of postsecondary courses; by contrast, the math elements are typically narrower in scope and often relegated to particular courses, such as geometry skills and knowledge in geometry courses. Skill/knowledge elements with "unimportant" ratings, therefore, may be genuinely "unimportant" or may simply be specific to some courses and not others. This curriculum survey serves as only one piece of evidence—albeit an important one—in College Board's ongoing determination of elements to include on its SAT Suite tests, and readers shouldn't make precipitous decisions about various elements' importance (or lack thereof) without due consideration of a wider range of evidence than that provided here.

Given the greater heterogeneity of the postsecondary math results relative to those for literacy, we next consider the former on a content domain–by–content domain basis and incorporate the mean importance ratings from the math and science subsamples alongside those from the overall postsecondary math sample.

Figure 3 displays the postsecondary math results for the Algebra content domain. In this and subsequent figures in this subsection, the ratings of the three postsecondary math respondent groups (overall sample, math subsample, science subsample) are graphed, and a dotted vertical line again denotes the 2.5 "important" threshold.

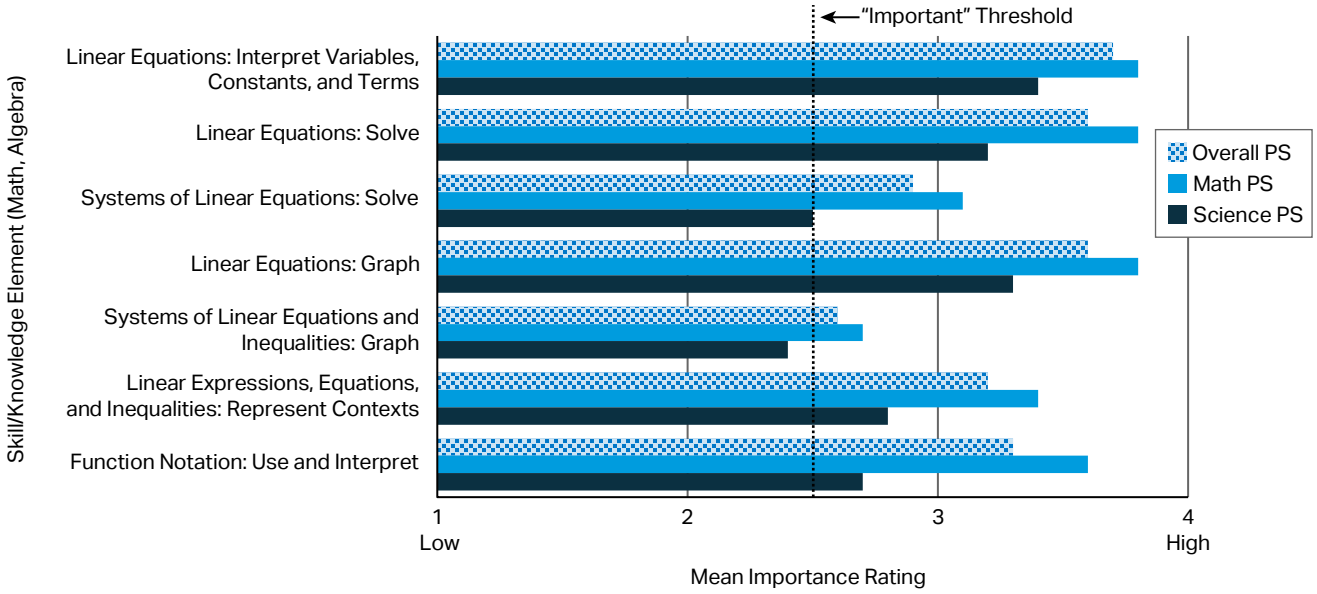


Figure 3. **Math Skill/Knowledge Elements, Algebra Content Domain: Postsecondary (PS) Respondents—Mean Importance Ratings by Overall Sample and by Math and Science Subsamples.**

All Algebra elements were rated important by both the overall postsecondary math sample and by the math and science subsamples with the exception of "Systems of Linear Equations and Inequalities: Graph," which was rated important by the overall sample and math subsample but unimportant (2.4)—if just barely—by the science subsample. These findings suggest strong, general

agreement on the importance of Algebra skills and knowledge—likely in part because of those elements' broad applicability across a range of math and science courses.

Figure 4 displays the postsecondary math results for the Advanced Math content domain.

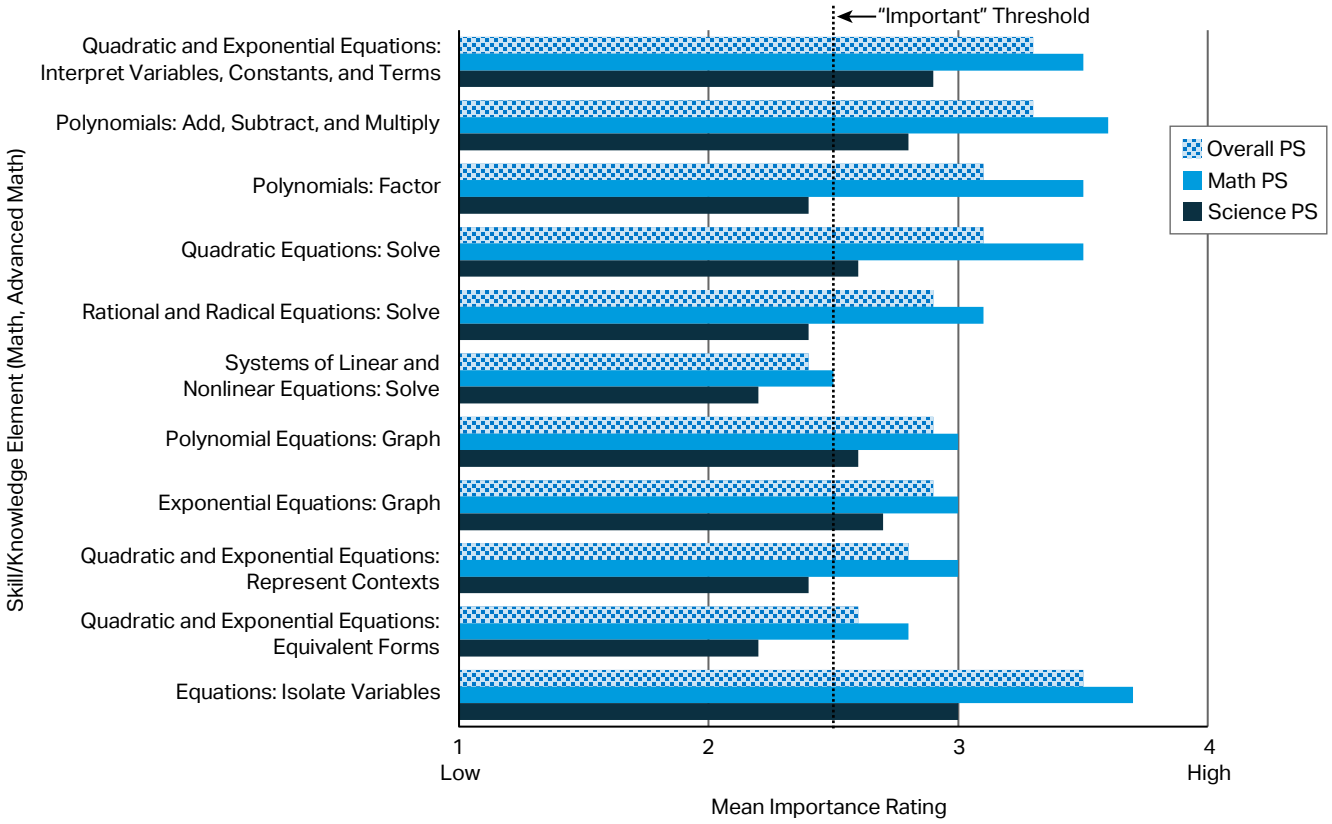


Figure 4. **Math Skill/Knowledge Elements, Advanced Math Content Domain: Postsecondary (PS) Respondents—Mean Importance Ratings by Overall Sample and by Math and Science Subsamples.**

All Advanced Math elements were rated important by the math subsample, and all but one element—"Systems of Linear and Nonlinear Equations: Solve"—were rated important by the overall postsecondary math sample as well. The science subsample rated five elements unimportant: "Polynomials: Factor" (2.4), "Rational and Radical Equations: Solve" (2.4), "Systems of Linear and Nonlinear Equations: Solve" (2.2), "Quadratic and Exponential Equations: Represent Contexts" (2.4), and "Quadratic and Exponential Equations: Equivalent Forms" (2.2). These findings suggest that the Advanced Math skill/knowledge elements are broadly valued as college readiness prerequisites by postsecondary math instructors and to some extent by postsecondary science instructors as well.

Figure 5 displays the postsecondary math results for the Problem-Solving and Data Analysis content domain.

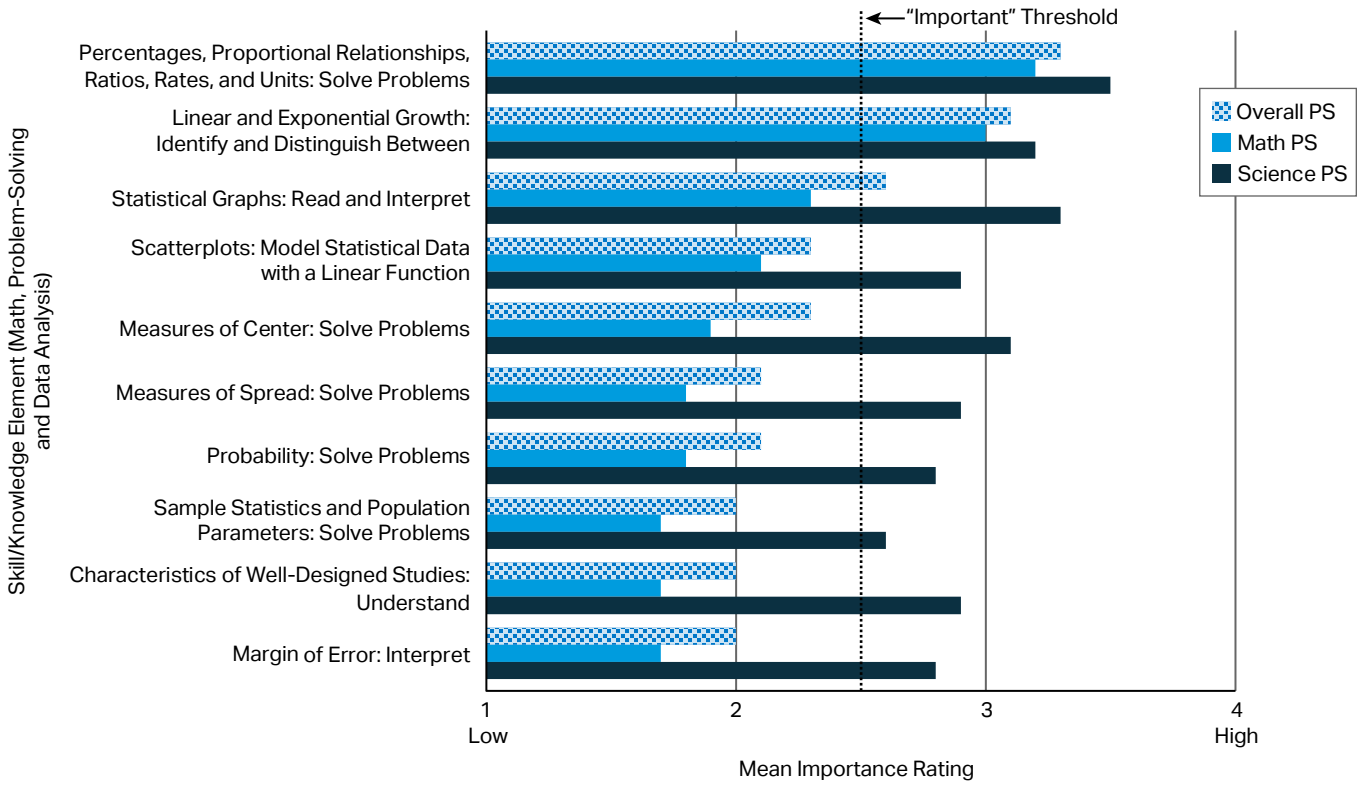


Figure 5. **Math Skill/Knowledge Elements, Problem-Solving and Data Analysis Content Domain: Postsecondary (PS) Respondents—Mean Importance Ratings by Overall Sample and by Math and Science Subsamples.**

All Problem-Solving and Data Analysis elements were rated important by the science subsample. Two elements—"Percentages, Proportional Relationships, Ratios, Rates, and Units: Solve Problems" and "Linear and Exponential Growth: Identify and Distinguish Between"—were also rated important by both the overall postsecondary math sample and the math subsample, while a third element—"Statistical Graphs: Read and Interpret"—was rated important by the overall postsecondary math sample but not by the math subsample. Seven elements were rated unimportant by both the overall postsecondary math sample and the math subsample: "Scatterplots: Model Statistical Data with a Linear Function" (2.3 overall sample, 2.1 math subsample), "Measures of Center: Solve Problems" (2.3, 1.9), "Measures of Spread: Solve Problems" (2.1, 1.8), "Probability: Solve Problems" (2.1, 1.8), "Sample Statistics and Population Parameters: Solve Problems" (2.0, 1.7), "Characteristics of Well-Designed Studies: Understand" (2.0, 1.7), and "Margin of Error: Interpret" (2.0, 1.7). These findings suggest that the Problem-Solving and Data Analysis skill/knowledge elements are broadly valued as college readiness prerequisites by postsecondary science instructors and to some extent by postsecondary math instructors as well.

Figure 6 displays the postsecondary math results for the Geometry and Trigonometry content domain.

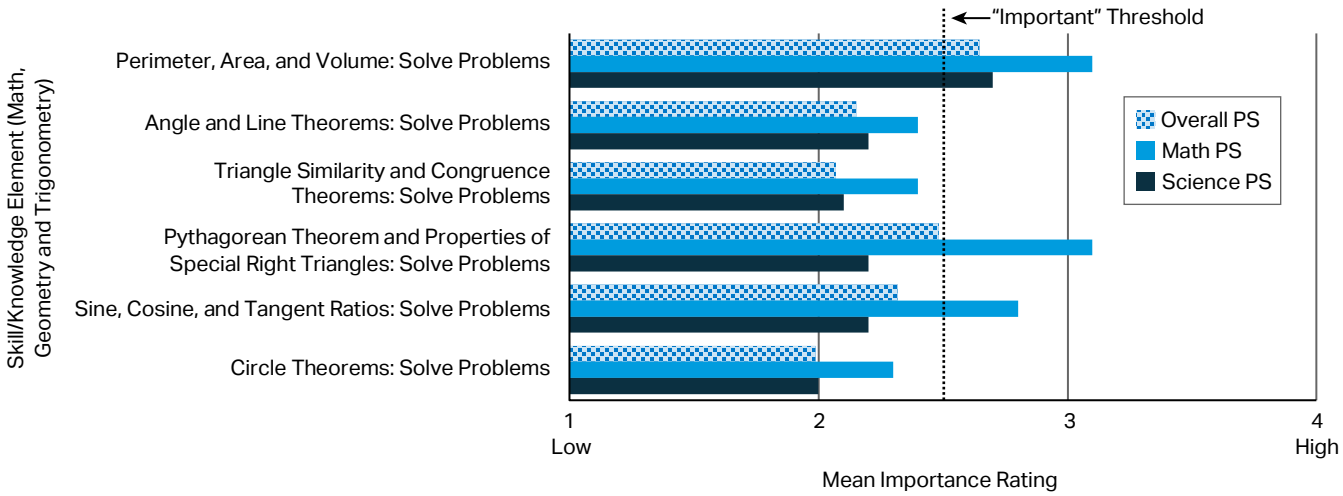


Figure 6. **Math Skill/Knowledge Elements, Geometry and Trigonometry Content Domain: Postsecondary (PS) Respondents—Mean Importance Ratings by Overall Sample and by Math and Science Subsamples.**

One Geometry and Trigonometry element—"Perimeter, Area, and Volume: Solve Problems"—was rated important by the overall postsecondary math sample and by the math and science subsamples. Conversely, three Geometry and Trigonometry elements were rated unimportant by both the overall postsecondary math sample and the math and science subsamples: "Angle and Line Theorems: Solve Problems" (2.4 overall sample, 2.4 math subsample, 2.2 science subsample), "Triangle Similarity and Congruence Theorems: Solve Problems" (2.3, 2.4, 2.1), and "Circle Theorems: Solve Problems" (2.2, 2.3, 2.0). The remaining two Geometry and Trigonometry elements—"Pythagorean Theorem and Properties of Special Right Triangles: Solve Problems" and "Sine, Cosine, and Tangent Ratios: Solve Problems"—were rated important by the overall postsecondary math sample and by the math subsample but not by the science subsample (which gave each of those elements a mean importance rating of 2.2).

These findings shouldn't, however, be taken as clear indication of these elements' absolute lack of importance. As previously noted, postsecondary respondents were asked to evaluate elements in terms of their importance as prerequisites for the courses they'd identified. It's possible that these elements are important to a few specialized courses but lack the broad applicability of, in particular, the elements of the Algebra domain; it's also possible that some or all these elements are viewed as standard entry-level, credit-bearing course content rather than as prerequisites for success in those courses. The safest conclusion is that, as a group, these Geometry and Trigonometry elements are relatively (rather than absolutely) less important as college-entry requirements than are others the postsecondary math respondents evaluated.

Indeed, it's prudent at this point to reexamine the grand mean importance ratings for the various math content domains as a check on the mean importance ratings by individual skill/knowledge elements. Table 7 summarizes those data.

Table 7. **Postsecondary Math Content Domain Grand Mean Importance Ratings and (Standard Deviations) by Overall Sample and by Math and Science Subsamples.**

Content Domain	Overall	Math	Science
Algebra	3.3 (0.4) ✓	3.5 (0.4) ✓	2.9 (0.4) ✓
Advanced Math	3.0 (0.3) ✓	3.2 (0.3) ✓	2.6 (0.3) ✓
Problem-Solving and Data Analysis	2.4 (0.5) ✘	2.1 (0.6) ✘	3.0 (0.3) ✓
Geometry and Trigonometry	2.6 (0.4) ✓	2.7 (0.4) ✓	2.2 (0.4) ✘

The table indicates broad agreement among postsecondary math respondents on the importance of the Algebra and Advanced Math content domains to incoming students' readiness for success in the courses they'd identified. Furthermore, we observe endorsement of the Problem-Solving and Data Analysis content domain by the postsecondary science subsample and endorsement of the Geometry and Trigonometry domain by both the overall postsecondary math sample and by the math subsample. These latter findings further reinforce the hypothesis that the Problem-Solving and Data Analysis and Geometry and Trigonometry content domains are still important for postsecondary readiness but may not be as universally critical as the other two domains.

ADDITIONAL MATH AND MATH-RELATED SKILL/KNOWLEDGE ELEMENTS

Postsecondary math respondents, like their ELAL counterparts, had an opportunity to supply open-ended feedback about additional math and math-related skills and knowledge they felt students need to be ready to succeed in their courses. As was also the case with ELAL, these comments often reiterated and emphasized previously identified skill/knowledge elements. Table 8 provides an overview of these results.

Table 8. **Math Skill/Knowledge Elements: Postsecondary Respondents—Additional Skill/Knowledge Elements (Open-Ended Comments).**

Category	Operational Definition	Freq	Illustrative Comments
Algebra Skills	Ability to create and manipulate algebraic expressions and equations, including solving linear and quadratic equations, factoring, and working with exponents and radicals	159	"First, that they know how to read a problem. Second, after reading a problem, they should be able to create an equation or inequality and solve it." – 4-year college, math "General numeracy. Rules of exponents and radicals. Ability to correctly cancel factors which are common to the numerator and denominator of a quotient. General exposure to/understanding of mathematical terminology: *product*, *quotient*, *ratio*, *factor*, *term* (in a sum or difference), *radical*, *radicand*, *integer*, *rational* vs. *irrational numbers*, etc." – 4-year college, math
Arithmetic and Numeracy	Mastery of basic number operations, fractions, decimals, percentages, ratios, proportional reasoning, and estimation	133	"Arithmetic skills without the use of a calculator." – 2-year college, math "Students should understand basic algebraic terminology for an introductory biology course, but a lot of the math and statistics can be explained in the course and upper-division courses. As an ecologist, so much of what I publish professionally is statistical and mathematical. You can take high school courses in statistics and math, but learning their applications to biology from a real biologist is different in the context of experiments." – 4-year college, science

Table 8 (continued)

Category	Operational Definition	Freq	Illustrative Comments
Functions and Graphs	Understanding of functions, coordinate systems, graphing, and interpretation of graphical relationships	93	"Understand what a function is, including trig functions; have the skills to check whether a math 'rule' is actually valid instead of just memorizing (and forgetting) formulas." – 4-year college, math "Properties of logarithms and exponential functions. Solving logarithmic and exponential functions. Using and interpreting the point slope form of a line. Reducing rational functions by factoring and canceling." – 4-year college, math
Math Vocabulary and Symbol Sense	Understanding and correct use of mathematical terminology, symbols, and notation	70	"Plugging formulas into functions; using notation clearly and consistently; interpreting math symbols like equals signs as semantic rather than just instructions to do computations." – 4-year college, math "Determining the difference between an expression and an equation, utilizing math notation correctly, organizing their work, effectively communicating the concepts, estimating arithmetic, assessing the validity of a response, detecting errors in their work." – 4-year college, math
Geometry and Measurement	Knowledge of geometric properties, formulas, measurement, and spatial reasoning	37	"Graphing skills, basic geometry, scientific notation." – 4-year college, science "Solving trig identities. Using the unit circle to determine trig values." – 4-year college, math
Technology Use in Math	Appropriate use of calculators, software, and digital tools, balanced with conceptual understanding	36	"Be able to convert fractions and percentages in their head. Be able to determine dosages without a calculator or chart." – 4-year college, science "Be able to add, subtract, multiply, and divide without a calculator. Be able to tell if an answer makes any sense. Be able to show their work." – 4-year college, math
Study Skills and Habits for Math	Strategies that support math learning, such as regular practice, organization, persistence, and self-review	35	"Students need to be literate even in a math course. A significant element in understanding and in utilizing key mathematical concepts requires the students have adequate verbal skills. If students cannot read and interpret information presented in written English, they will probably not succeed in the course." – 2-year college, math "Being able to organize their work for a problem in a very basic linear fashion rather than writing scribbles in a random order all over the page." – 4-year college, math
Statistics and Data Analysis	Interpreting, analyzing, and representing data using statistical measures and visual displays	34	"Understanding the shape of a normal distribution." – 4-year college, math "Using formulas, dimensional analysis, unit rates, logical problem-solving, proportions, regression." – 2-year college, math
Problem-Solving and Quantitative Reasoning	Applying logical and mathematical reasoning to interpret, analyze, and solve multistep or real-world problems	32	"Be able to read and interpret word problems in math courses." – 4-year college, math "Basic reasoning, basic algebraic manipulation, some numeracy." – 4-year college, math
Uncategorized	Comments too vague, idiosyncratic, or not clearly fitting the above categories	37	

As noted above, most of the comments addressed topics already formally covered by the math survey, with "technology use in math" and "study skills and habits for math" being additions relevant to rounding out a rigorous mathematics education.

Secondary Respondents

As previously noted, secondary respondents were presented with the same literacy and math skill/knowledge elements as their postsecondary colleagues but given a different framing question. Instead of being asked to rate the elements in terms of their importance as college readiness prerequisites, secondary respondents were directed to indicate whether they formally taught each element in the class they'd identified and, if so, at what instructional level they typically taught that element: at an honors/advanced level, on grade level, or as review or remediation. "Formally taught" was presented to respondents as the criterion with the intention of excluding from consideration those elements that may come up incidentally or opportunistically in the respondents' classes but aren't a regular, established part of instruction.

In the figures that follow in this subsection, secondary respondent results are displayed in a series of grids by content domain (e.g., Information and Ideas in literacy; Algebra in math). Each content domain "block" contains separate grids for the overall sample (ELAL or math) and for each subject area subsample. Each block consists of four columns: taught at an honors/advanced level, taught on grade level, taught at a remedial/review level, and not (formally) taught. The results in each block's row add up to approximately 100 (with some deviation due to rounding) and represent that sample's or subsample's responses to a given skill/knowledge element. Values in individual cells represent the percentage of respondents indicating each response for each element.

While there are no well-established *a priori* standards for evaluating these sorts of percentage data, we propose and employ the following criteria here and subsequently to establish which skill/knowledge elements were considered "emphasized" by secondary respondents:

For literacy:

Criterion 1: Taught "on grade" percentage ≥ 33

Criterion 2: "Not taught" percentage ≤ 15

Criterion 1 serves as an indicator that a substantial proportion of respondents consider the element as part of standard class content, while criterion 2 serves as a check that a given element isn't being ignored in formal instruction by a significant proportion of respondents. We propose that these dual criteria are warranted given the fact that literacy education expectations are typically not sharply segmented by classes or grades but rather tend to be taught at successively higher levels of sophistication as students advance through secondary schooling.

For math:

Taught "on grade" percentage ≥ 33

We removed the second criterion for this subject area because the teaching of math skill/knowledge elements tends to be more segmented by course and grade than in literacy. That is, algebra courses typically focus mainly on algebra, geometry courses on geometry, and so on. Therefore, "not taught" percentages aren't good indicators of

(inappropriate) lack of emphasis, as we wouldn't, say, expect Algebra I teachers to be routinely teaching geometry.

Going forward and for the sake of clarity and simplicity, we refer to the various criteria being "met" if the taught "on grade" percentage was greater than or equal to 33 and, for literacy only, if the "not taught" percentage was less than or equal to 15; conversely, we refer to the various criteria being "failed" if the percentages fall outside the acceptable ranges.

To further denote whether a particular cell's value met or failed the applicable criterion, shading and symbols are used: blue shading and a checkmark symbol (✓) indicate a cell whose value has met the criterion, while orange shading and an "x" symbol (✘) indicate a cell whose value failed the criterion.

Example

An excerpt of figure 7 (below) appears here, representing the overall secondary ELAL sample's responses to the Information and Ideas skill/knowledge elements.

Considering the "Explicit Information" row, we observe that 46 percent of the overall secondary ELAL sample reported teaching this element primarily on grade level. As 46 is greater than or equal to 33 (criterion 1), the cell is shaded blue and includes a "✓" symbol. The "not taught" proportion, 3 percent, is less than or equal to 15 (criterion 2), so that cell is also shaded blue and includes a "✓." Considering the "Quantitative Evidence" row, we observe that while 38 percent of the overall secondary ELAL sample reported teaching this element primarily on grade level (blue shading, "✓"), 16 percent reported not formally teaching this element (orange shading, "✘").

	Overall (*n* = 3,770*)			
	Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Explicit Information	43%	46% ✓	9%	3% ✓
Inferences and Conclusions	45%	46% ✓	7%	3% ✓
Main Ideas, Central Claims, and Themes	41%	47% ✓	7%	5% ✓
Textual Evidence	44%	45% ✓	7%	4% ✓
Quantitative Evidence	37%	38% ✓	9%	16% ✗

Literacy results are again presented first, followed by math. Within the math presentation, high school respondents' data are first presented, followed by those of middle school/junior high school respondents. (Middle school/junior high school ELAL teachers weren't sampled, as it was expected that their results would largely mirror those of their high school counterparts, given the aforementioned "spiraling" of the same skill/knowledge elements throughout the secondary years.)

SURVEYED LITERACY SKILL/KNOWLEDGE ELEMENTS

In this subsection, we consider each of the five literacy content domains in terms of secondary (high school) respondents.

Figure 7 displays the secondary results for the Information and Ideas content domain.

	Overall (*n* = 3,770*)				English Language Arts (*n* = 2,387*)				Humanities (Other than English) (*n* = 147*)				Social Studies (*n* = 419*)				Science (*n* = 817*)			
	Instructional Level				Instructional Level				Instructional Level				Instructional Level				Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Explicit Information	43%	46% ✓	9%	3% ✓	41%	49% ✓	9%	1% ✓	43%	47% ✓	6%	4% ✓	55%	38% ✓	6%	1% ✓	44%	39% ✓	8%	9% ✓
Inferences and Conclusions	45%	46% ✓	7%	3% ✓	42%	50% ✓	8%	0% ✓	45%	45% ✓	4%	6% ✓	57%	36% ✓	6%	1% ✓	46%	38% ✓	7%	9% ✓
Main Ideas, Central Claims, and Themes	41%	47% ✓	7%	5% ✓	41%	52% ✓	7%	0% ✓	40%	52% ✓	3%	5% ✓	54%	37% ✓	6%	3% ✓	34%	38% ✓	7%	21% ✗
Textual Evidence	44%	45% ✓	7%	4% ✓	43%	50% ✓	7%	0% ✓	38%	46% ✓	7%	9% ✓	58%	33% ✓	6%	2% ✓	42%	36% ✓	6%	16% ✗
Quantitative Evidence	37%	38% ✓	9%	16% ✗	25%	41% ✓	11%	23% ✗	32%	38% ✓	11%	20% ✗	54%	38% ✓	7%	2% ✓	64%	31% ✗	4%	1% ✓

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 7. **Literacy Skill/Knowledge Elements: Secondary Respondents—Information and Ideas Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall secondary ELAL sample, all five Information and Ideas skill/knowledge elements met criterion 1, and all elements but one—"Quantitative Evidence"—met criterion 2, with "Quantitative Evidence" just missing the cutoff at 16 percent. The English language arts and humanities (other than English) subsamples follow the same pattern. All five elements met both criteria in the social studies subsample. The science subsample was more heterogeneous: Two elements—"Explicit Information" and "Inferences and Conclusions"—met both criteria; two other elements—"Main Ideas, Central Claims, and Themes" and "Textual Evidence"—met criterion 1 but not criterion 2; and a fifth element—"Quantitative Evidence"—failed criterion 1 but not criterion 2. In general terms, the findings indicate that Information and Ideas skill/knowledge elements are emphasized by secondary respondents.

Before we move on, however, the responses to "Quantitative Evidence" are worth interrogating a bit further. As a reminder, the actual language for this survey item, as presented to respondents, reads as follows:

> Determine the quantitative evidence from a data display (e.g., graph, table) that most strongly supports, weakens, or illustrates a claim, hypothesis, or point presented in a text

Two outcomes stand out as particularly intriguing. First, both the overall secondary ELAL sample and the subject area subsamples report generally high rates of formal teaching of "Quantitative Evidence," even in the areas of English language arts and humanities (other than English), with "not taught" rates topping out at around only 20 percent and often far lower. This suggests significant penetration of quantitative and data analysis skills and knowledge into all examined areas of the secondary curriculum. Second, while responses from the overall secondary ELAL sample and the English language arts, humanities, and social studies subsamples met criterion 1, the science subject area subsample didn't. Although this seemingly counterintuitive result can't be clearly explained from the data, we suspect that the survey item's reference to working with quantitative evidence *in texts* may have led to the surprisingly low rate of on-grade-level instruction in this element.

Figure 8 displays the secondary results for the Craft and Structure content domain.

	Overall (*n* = 3,770*)				English Language Arts (*n* = 2,387*)				Humanities (Other than English) (*n* = 147*)				Social Studies (*n* = 419*)				Science (*n* = 817*)			
	Instructional Level				Instructional Level				Instructional Level				Instructional Level				Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
High-Utility Vocabulary: Meaning	41%	46% ✓	9%	4% ✓	35%	51% ✓	11%	3% ✓	42%	45% ✓	6%	7% ✓	53%	39% ✓	5%	3% ✓	49%	37% ✓	6%	8% ✓
High-Utility Vocabulary: Use	42%	43% ✓	10%	5% ✓	37%	47% ✓	11%	4% ✓	45%	38% ✓	6%	11% ✓	51%	37% ✓	7%	5% ✓	51%	35% ✓	8%	7% ✓
Text Structure: Overall	38%	44% ✓	8%	9% ✓	37%	49% ✓	10%	5% ✓	38%	40% ✓	8%	14% ✓	46%	38% ✓	7%	10% ✓	38%	36% ✓	5%	21% ✗
Text Structure: Part-Whole Relationships	38%	44% ✓	8%	11% ✓	40%	49% ✓	9%	2% ✓	39%	43% ✓	7%	11% ✓	49%	36% ✓	6%	9% ✓	26%	32% ✗	7%	36% ✗
Text Purpose	39%	47% ✓	6%	7% ✓	40%	52% ✓	6%	1% ✓	40%	49% ✓	5%	5% ✓	54%	38% ✓	5%	4% ✓	28%	37% ✓	7%	28% ✗
Text Point of View/ Perspective	38%	45% ✓	6%	11% ✓	40%	52% ✓	7%	1% ✓	39%	44% ✓	7%	11% ✓	55%	35% ✓	5%	5% ✓	21%	31% ✗	6%	41% ✗
Text Synthesis (Paired Texts)	41%	42% ✓	8%	9% ✓	40%	48% ✓	9%	4% ✓	44%	37% ✓	8%	11% ✓	59%	31% ✗	6%	4% ✓	36%	31% ✗	7%	26% ✗

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 8. **Literacy Skill/Knowledge Elements: Secondary Respondents—Craft and Structure Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall secondary ELAL sample, all seven Craft and Structure skill/knowledge elements met both criteria. The same was true for the English language arts and humanities (other than English) subsamples. For the social studies subsample, all but one element—"Text Synthesis (Paired Texts)"—met criterion 1, and all seven elements met criterion 2. For the science subsample, three elements—"Text Structure: Part-Whole Relationships," "Text Point of View/Perspective," and "Text Synthesis (Paired

Texts)"—failed criterion 1, while these same elements plus "Text Structure: Overall" and "Text Purpose" failed criterion 2. Generally speaking, the findings indicate that Craft and Structure skill/knowledge elements are emphasized by secondary respondents.

Figure 9 displays the secondary results for the Expression of Ideas content domain.

	Overall (*n* = 3,770*)				English Language Arts (*n* = 2,387*)				Humanities (Other than English) (*n* = 147*)				Social Studies (*n* = 419*)				Science (*n* = 817*)			
	Instructional Level				Instructional Level				Instructional Level				Instructional Level				Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Arrangement of Words, Phrases, and Clauses	34%	39% ✔	10%	17% ✗	37%	43% ✔	12%	8% ✔	38%	40% ✔	10%	12% ✔	39%	38% ✔	6%	16% ✗	22%	29% ✗	6%	43% ✗
Transitions	32%	45% ✔	10%	13% ✔	35%	52% ✔	11%	1% ✔	35%	43% ✔	12%	9% ✔	40%	38% ✔	8%	14% ✔	20%	30% ✗	7%	44% ✗

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 9. **Literacy Skill/Knowledge Elements: Secondary Respondents—Expression of Ideas Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall secondary ELAL sample, the two Expression of Ideas skill/knowledge elements met criterion 1, while one element—"Arrangement of Words, Phrases, and Clauses"—failed criterion 2. Both elements met both criteria in the English language arts and humanities (other than English) subsamples. For the social studies subsample, one element—"Arrangement of Words, Phrases, and Clauses"—met only criterion 1, while the other element—"Transitions"—met both criteria. Both elements failed both criteria in the science subsample. Broadly speaking, the findings suggest that the Expression of Ideas elements are emphasized as part of secondary instruction, particularly in the English language arts and humanities areas.

Figure 10 displays the secondary results for the Standard English Conventions content domain.

Skill/Knowledge Element	Overall (*n* = 3,770*)				English Language Arts (*n* = 2,387*)				Humanities (Other than English) (*n* = 147*)				Social Studies (*n* = 419*)				Science (*n* = 817*)			
	Instructional Level				Instructional Level				Instructional Level				Instructional Level				Instructional Level			
	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
End-of-Sentence Punctuation	24%	43% ✓	14%	19% ✗	26%	52% ✓	17%	5% ✓	29%	45% ✓	13%	13% ✓	28%	35% ✓	11%	26% ✗	13%	25% ✗	9%	53% ✗
List and Clause Punctuation	22%	41% ✓	14%	23% ✗	25%	51% ✓	17%	7% ✓	28%	41% ✓	12%	19% ✗	26%	31% ✗	11%	32% ✗	12%	21% ✗	7%	60% ✗
Punctuation for Supplementary Information	23%	38% ✓	12%	26% ✗	27%	47% ✓	14%	12% ✓	30%	37% ✓	14%	19% ✗	29%	27% ✗	10%	34% ✗	12%	21% ✗	6%	61% ✗
Unnecessary Punctuation	21%	37% ✓	14%	28% ✗	24%	47% ✓	17%	12% ✓	24%	38% ✓	13%	25% ✗	27%	25% ✗	11%	37% ✗	11%	18% ✗	6%	65% ✗
Subject-Verb Agreement	21%	40% ✓	15%	24% ✗	23%	50% ✓	18%	8% ✓	31%	39% ✓	13%	18% ✗	25%	29% ✗	12%	34% ✗	12%	21% ✗	8%	59% ✗
Verbs and Verbals Use	17%	34% ✓	15%	34% ✗	18%	41% ✓	19%	22% ✗	30%	42% ✓	10%	18% ✗	23%	24% ✗	10%	43% ✗	10%	20% ✗	7%	64% ✗
Appropriate Verb Tense/ Aspect	18%	36% ✓	16%	30% ✗	18%	45% ✓	21%	16% ✗	27%	46% ✓	10%	17% ✗	25%	23% ✗	11%	40% ✗	11%	20% ✗	7%	62% ✗
Modifying Elements	19%	36% ✓	15%	31% ✗	21%	43% ✓	19%	17% ✗	26%	46% ✓	10%	18% ✗	24%	26% ✗	11%	39% ✗	11%	19% ✗	7%	63% ✗
Plural and Possessive Nouns and Pronouns	18%	37% ✓	16%	30% ✗	19%	44% ✓	20%	16% ✗	27%	48% ✓	10%	15% ✓	24%	24% ✗	11%	40% ✗	10%	20% ✗	7%	63% ✗
Possessive Determiners	18%	38% ✓	18%	26% ✗	19%	46% ✓	24%	11% ✓	25%	47% ✓	12%	17% ✗	24%	25% ✗	12%	38% ✗	10%	21% ✗	9%	61% ✗

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 10. **Literacy Skill/Knowledge Elements: Secondary Respondents—Standard English Conventions Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall secondary ELAL sample, all ten Standard English Conventions skill/knowledge elements met criterion 1 but failed criterion 2. In the English language arts subsample, all elements met criterion 1, while six elements—"End-of-Sentence Punctuation," "List and Clause Punctuation," "Punctuation for Supplementary Information," "Unnecessary Punctuation," "Subject-Verb Agreement," and "Possessive Determiners"—met both criteria. For the humanities (other than English) subsample, all elements met criterion 1, while only two elements—"End-of-Sentence Punctuation" and "Plural and Possessive Nouns and Pronouns"—also met criterion 2. For the social studies subsample, only "End-of-Sentence Punctuation" met criterion 1, and no element met criterion 2. For the science subsample, no element met either criterion. In general terms, the findings suggest somewhat uneven emphasis on Standard English Conventions skill/knowledge elements, with more emphasis in English language arts and

humanities classes and less in social studies and science classes. This is an unsurprising result given that "grammar" instruction has traditionally been the province of the English language arts classroom. If we limit our focus to the English language arts subsample, we observe that all elements met criterion 1, while all but four elements—"Verbs and Verbals Use," "Appropriate Verb Tense/Aspect," "Modifying Elements," and "Plural and Possessive Nouns and Pronouns"—met criterion 2.

Taken together, these findings indicate some emphasis on Standard English conventions in the curricular areas we would most likely expect to find it, though the relatively high criterion-failing rates of "not taught" for many elements is a source of some concern. In Section 5. Summary, Discussion, and Conclusion, we more fully consider reasons why this might be, including curricula that favor incidental (rather than "formal") instruction on conventions and the likelihood that some teachers may consider these elements to have been attained by students prior to the high school years.

Finally, figure 11 displays the secondary results for the Essay (Argument Analysis) content domain.

	Overall (*n* = 3,770*)				English Language Arts (*n* = 2,387*)				Humanities (Other than English) (*n* = 147*)				Social Studies (*n* = 419*)				Science (*n* = 817*)			
	Instructional Level				Instructional Level				Instructional Level				Instructional Level				Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Analyze Arguments: Use of Evidence	40%	41% ✓	8%	11% ✓	39%	47% ✓	8%	5% ✓	38%	34% ✓	9%	19% ✗	55%	31% ✗	6%	8% ✓	34%	32% ✗	6%	29% ✗
Analyze Arguments: Use of Logical Reasoning	39%	39% ✓	8%	13% ✓	39%	45% ✓	9%	7% ✓	36%	34% ✓	9%	21% ✗	52%	31% ✗	7%	10% ✓	33%	30% ✗	6%	32% ✗
Analyze Arguments: Use of Stylistic and Persuasive Elements	38%	36% ✓	8%	18% ✗	42%	43% ✓	9%	6% ✓	38%	34% ✓	9%	19% ✗	49%	31% ✗	6%	14% ✓	19%	21% ✗	5%	55% ✗
Write Logical Arguments	45%	44% ✓	7%	3% ✓	41%	50% ✓	8%	1% ✓	44%	37% ✓	9%	10% ✓	57%	34% ✓	4%	5% ✓	52%	35% ✓	6%	7% ✓
Write Informative/Explanatory Texts	39%	46% ✓	8%	7% ✓	34%	51% ✓	9%	6% ✓	36%	48% ✓	10%	5% ✓	52%	38% ✓	5%	5% ✓	45%	37% ✓	6%	12% ✓

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 11. **Literacy Skill/Knowledge Elements: Secondary Respondents—Essay (Argument Analysis) Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall secondary ELAL sample, all five elements met criterion 1, and all but one element—"Analyze Arguments: Use of Stylistic and Persuasive Elements"—also met criterion 2. In the English language arts subsample, all elements met both criteria. In the humanities (other than English) subsample, all elements met criterion 1, but only two elements—"Write Logical Arguments" and "Write Informative/Explanatory Texts"—met criterion 2. In the social studies subsample, only two elements—"Write Logical

Arguments" and "Write Informative/Explanatory Texts"—met criterion 1, while all five elements met criterion 2. In the science subsample, the same two elements—"Write Logical Arguments" and "Write Informative/Explanatory Texts"—met both criteria, while the other three elements failed to meet either criterion. In broad terms, the findings indicate that the Essay (Argument Analysis) skill/knowledge elements are emphasized by secondary respondents, albeit more universally with respect to actual production of writing than to applying rhetorical techniques to the analysis of writing produced by others, as the two elements pertaining most directly to writing production met both criteria across all sample/subsample groups.

ADDITIONAL LITERACY AND LITERACY-RELATED SKILLS AND KNOWLEDGE

Table 9 provides an overview of the open-ended comments from secondary ELAL respondents to the prompt for additional literacy and literacy-related skills and knowledge.

Table 9. **Literacy Skill/Knowledge Elements: Secondary Respondents—Additional Skill/Knowledge Elements (Open-Ended Comments).**

Category	Operational Definition	Freq	Illustrative Comments
Writing Skills and Composition	Producing clear, organized writing, including thesis development, argumentation, coherence, and revision	380	"They are to be ready for college writing classes and assignments." – High school, English language arts "Using active verbs and present tense verbs when writing about literature . . . literature is 'alive.'" – High school, English language arts
Reading Comprehension	Understanding, interpreting, and analyzing texts, including close reading and evidence-based interpretation	331	"My students learn to read and analyze a variety of texts, with a focus on literary analysis and rhetorical analysis." – High school, English language arts "Close reading is taught to help student[s] read at their grade level or above." – High school, English language arts
Critical Thinking and Analysis	Applying logical reasoning to evaluate arguments, synthesize ideas, and make evidence-based judgments	266	"Critical thinking." – High school, English language arts "Critical thinking, formation of a thesis, acknowledgement of an author's thesis, and discussion both verbal and digital." – High school, English language arts
Research and Information Literacy	Locating, evaluating, integrating, and citing sources ethically and effectively, including media literacy	224	"Evaluating a source for credibility by the author or publication information. The revision process, which means more than editing or proofreading for grammar and conventions." – High school, English language arts "I teach the proper APA research format; freshmen at our school must learn this format since they will use it in all of their upper-level and college coursework. This is an early-college high school." – High school, English language arts

Table 9 (continued)

Category	Operational Definition	Freq	Illustrative Comments
Vocabulary and Academic Language	Knowledge and use of general academic and discipline-specific vocabulary	129	"This course is English 110, so we complete a variety of activities that lend themselves to using domain-specific vocabulary. My expectation is that students arrive with a firm grasp of grammatical concepts." – High school, English language arts "Latin and Greek prefixes and suffixes." – High school, science
Grammar and Mechanics	Control of sentence structure, punctuation, capitalization, spelling, and usage	116	"Pronoun referent and antecedent." – High school, English language arts "Grammar skills are not remembered year to year. This tells me that we are not effectively reaching long-term memory. Worksheets do not work! Practice and using literature as a model helps students better comprehend and use [it] in their own writing. It needs to happen consistently for students to be able [to] write appropriately." – High school, English language arts
Oral Communication and Presentation	Preparing and delivering spoken communication, including discussion and presentation skills	81	"Analyzing rhetorical strategies and purpose in writing and speaking. Using literary lenses to analyze texts." – High school, English language arts "We teach email etiquette, and oral communication skills are also embedded in the 12th-grade English classes." – High school, English language arts
Study Skills and Habits	Time management, note-taking, organization, persistence, and other self-regulation strategies that support learning	69	"I teach prewriting and organization using outlines for paragraphs as well as entire essays." – High school, English language arts ". . . I expected questions about academic independence, persistence, self-reflection on understanding, and so forth that are much more important parts of success in college than the discipline-specific skills of literary reading comprehension or rhetorical devices. . . ." – High school, science
Quantitative and Visual Literacy	Reading, interpreting, and integrating quantitative or visual information, such as graphs, charts, tables, and figures, into reading and writing tasks	54	"Close reading of visual texts in addition to written ones." – High school, English language arts "I help students learn how to use key words and context clues, along with making inferences, to help them determine quantitative data that can help them solve a problem." – High school, science
Uncategorized	Comments too vague, idiosyncratic, or not clearly aligned to the categories above	159	

Comments about "writing skills and composition" and "reading comprehension" were again most numerous, as was the case with the postsecondary ELAL respondents, although, unlike the latter, the secondary respondents had somewhat more comments about writing than reading. The secondary respondents followed a pattern similar to that of the postsecondary respondents, reemphasizing some skill/knowledge areas already formally covered by the survey (e.g., "vocabulary and academic language") while also commenting on students' need to develop skills and knowledge in "research and information literacy," "oral communication and presentation," "study skills and habits," and "quantitative and visual literacy."

SURVEYED MATH SKILL/KNOWLEDGE ELEMENTS

In the following subsection, high school math results are presented first, followed by middle school/junior high school math results. Recall that only the taught "on grade" criterion is, per our methodology, pertinent for this subject area.

High School

Figure 12 displays the high school results for the Algebra content domain.

	Overall (*n* = 2,650*)				Math (*n* = 1,853*)				Science (*n* = 797*)			
	Instructional Level				Instructional Level				Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Linear Equations: Interpret Variables, Constants, and Terms	32%	37% ✓	17%	13%	26%	39% ✓	22%	14%	46%	35% ✓	6%	13%
Linear Equations: Solve	24%	33% ✓	18%	25%	19%	35% ✓	23%	23%	34%	30% ✗	8%	28%
Systems of Linear Equations: Solve	19%	30% ✗	15%	37%	17%	35% ✓	19%	28%	22%	17% ✗	4%	58%
Linear Equations: Graph	24%	35% ✓	19%	21%	19%	36% ✓	25%	21%	37%	34% ✓	7%	22%
Systems of Linear Equations and Inequalities: Graph	16%	30% ✗	10%	44%	15%	36% ✓	14%	36%	16%	16% ✗	3%	65%
Linear Expressions, Equations, or Inequalities: Represent Contexts	26%	36% ✓	14%	24%	25%	40% ✓	18%	17%	30%	25% ✗	4%	42%
Function Notation: Use and Interpret	23%	33% ✓	12%	32%	25%	41% ✓	15%	20%	19%	14% ✗	4%	62%

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 12. **Math Skill/Knowledge Elements: High School Respondents—Algebra Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall high school math sample, five of seven Algebra skill/knowledge elements met the criterion, with the other two elements—"Systems of Linear Equations: Solve" and "Systems of Linear Equations and Inequalities: Graph"—falling just below the 33 percent threshold. In the math subsample, all seven skill/knowledge elements met the criterion, while in the science subsample only two of the seven elements—"Linear Equations: Interpret Variables, Constants, and Terms" and "Linear Equations: Graph"—met the criterion. Overall, the findings suggest that the skill/knowledge elements in the Algebra content domain are emphasized in high school math instruction.

Figure 13 displays the high school results for the Advanced Math content domain.

Skill/Knowledge Element	Overall (*n* = 2,650*) Instructional Level				Math (*n* = 1,853*) Instructional Level				Science (*n* = 797*) Instructional Level			
	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Quadratic and Exponential Equations: Interpret Variables, Constants, and Terms	30%	36% ✔	12%	22%	26%	41% ✔	14%	18%	39%	24% ✗	5%	32%
Polynomials: Add, Subtract, and Multiply	21%	35% ✔	13%	32%	21%	41% ✔	15%	23%	21%	20% ✗	6%	52%
Polynomials: Factor	19%	33% ✔	12%	35%	21%	41% ✔	15%	22%	14%	15% ✗	5%	66%
Quadratic Equations: Solve	21%	32% ✗	13%	34%	20%	38% ✔	17%	25%	23%	17% ✗	4%	56%
Rational and Radical Equations: Solve	21%	31% ✗	11%	38%	22%	37% ✔	13%	28%	17%	15% ✗	4%	63%
Systems of Linear and Nonlinear Equations: Solve	19%	25% ✗	8%	48%	20%	31% ✗	10%	38%	16%	11% ✗	3%	69%
Polynomial Equations: Graph	21%	30% ✗	9%	40%	23%	37% ✔	11%	29%	18%	15% ✗	3%	63%
Exponential Equations: Graph	23%	34% ✔	10%	32%	22%	40% ✔	13%	26%	27%	22% ✗	5%	46%
Quadratic and Exponential Equations: Represent Contexts	26%	34% ✔	8%	32%	26%	41% ✔	10%	22%	25%	18% ✗	3%	53%
Quadratic and Exponential Equations: Equivalent Forms	23%	30% ✗	7%	40%	25%	37% ✔	9%	28%	18%	12% ✗	2%	68%
Equations: Isolate Variables	29%	36% ✔	16%	20%	25%	40% ✔	20%	16%	38%	27% ✗	7%	29%

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 13. **Math Skill/Knowledge Elements: High School Respondents—Advanced Math Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall high school math sample, six of the eleven Advanced Math skill/knowledge elements met the criterion. In the math subsample, all but one element—"Systems of Linear and Nonlinear Equations: Solve"—met the criterion. In the science subsample, none of the skill/knowledge elements met the criterion. Generally speaking, the findings suggest that with the possible exception of "Systems of Linear and Nonlinear Equations: Solve," the Advanced Math skill/knowledge elements are emphasized in high school math instruction.

Figure 14 displays the high school results for the Problem-Solving and Data Analysis content domain.

Skill/Knowledge Element	Overall (*n* = 2,650*)				Math (*n* = 1,853*)				Science (*n* = 797*)			
	Instructional Level				Instructional Level				Instructional Level			
	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Percentages, Proportional Relationships, Ratios, Rates, and Units: Solve Problems	28%	35% ✓	16%	21%	19%	33% ✓	20%	29%	50%	38% ✓	7%	5%
Linear and Exponential Growth: Identify and Distinguish Between	29%	38% ✓	11%	22%	22%	39% ✓	13%	26%	44%	36% ✓	7%	14%
Statistical Graphs: Read and Interpret	28%	33% ✓	8%	32%	20%	33% ✓	9%	38%	47%	32% ✗	5%	16%
Scatterplots: Model Statistical Data with a Linear Function	27%	31% ✗	9%	32%	21%	33% ✓	10%	36%	42%	27% ✗	6%	24%
Measures of Center: Solve Problems	20%	29% ✗	10%	41%	16%	26% ✗	11%	48%	29%	35% ✓	10%	26%
Measures of Spread: Solve Problems	23%	23% ✗	6%	48%	18%	24% ✗	5%	53%	34%	21% ✗	6%	39%
Probability: Solve Problems	22%	26% ✗	6%	46%	18%	26% ✗	7%	49%	32%	26% ✗	6%	37%
Sample Statistics and Population Parameters: Solve Problems	23%	20% ✗	4%	53%	19%	19% ✗	4%	58%	31%	22% ✗	4%	42%
Characteristics of Well-Designed Studies: Understand	23%	19% ✗	4%	54%	19%	16% ✗	3%	62%	31%	26% ✗	5%	38%
Margin of Error: Interpret	25%	19% ✗	4%	51%	21%	15% ✗	3%	60%	35%	28% ✗	7%	30%

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 14. **Math Skill/Knowledge Elements: High School Respondents—Problem-Solving and Data Analysis Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall high school sample, three of the Problem-Solving and Data Analysis skill/knowledge elements—"Percentages, Proportional Relationships, Ratios, Rates, and Units: Solve Problems," "Linear and Exponential Growth: Identify and Distinguish Between," and "Statistical Graphs: Read and Interpret"—met the criterion. In the math subsample, those three elements plus "Scatterplots: Model Statistical Data with a Linear Function" met the criterion. In the science subsample, three elements met the criterion: "Percentages, Proportional Relationships, Ratios, Rates, and Units," "Linear and Exponential Growth," and "Measures of Center: Solve Problems." Five elements were emphasized neither by the overall high school math sample nor by either subject area subsample: "Measures of Spread: Solve Problems" (23 percent for the overall sample, 24 percent for the math subsample, 21 percent for the science subsample), "Probability: Solve Problems" (26 percent for the overall sample and both subsamples), "Sample Statistics and Population Parameters: Solve Problems" (20 percent, 19 percent,

22 percent), "Characteristics of Well-Designed Studies: Understand" (19 percent, 16 percent, 26 percent), and "Margin of Error: Interpret" (19 percent, 15 percent, 28 percent). The findings overall suggest that there may be some Problem-Solving and Data Analysis skill/knowledge elements that aren't being strongly emphasized in high school instruction.

Figure 15 displays the high school results for the Geometry and Trigonometry content domain.

	Overall (*n* = 2,650*)				Math (*n* = 1,853*)				Science (*n* = 797*)			
	Instructional Level				Instructional Level				Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Perimeter, Area, and Volume: Solve Problems	23%	33% ✓	14%	29%	20%	32% ✗	17%	31%	29%	36% ✓	9%	26%
Angle and Line Theorems: Solve Problems	13%	21% ✗	7%	60%	12%	25% ✗	8%	55%	13%	13% ✗	4%	71%
Triangle Similarity and Congruence: Solve Problems	12%	21% ✗	7%	60%	13%	25% ✗	9%	54%	12%	12% ✗	3%	74%
Pythagorean Theorem and Properties of Special Right Triangles: Solve Problems	20%	25% ✗	11%	44%	21%	31% ✗	14%	34%	17%	12% ✗	3%	68%
Sine, Cosine, and Tangent Ratios: Solve Problems	24%	25% ✗	6%	45%	27%	31% ✗	8%	34%	17%	12% ✗	2%	69%
Circle Theorems: Solve Problems	14%	19% ✗	5%	62%	15%	23% ✗	6%	56%	11%	11% ✗	2%	76%

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 15. **Math Skill/Knowledge Elements: High School Respondents—Geometry and Trigonometry Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall high school math sample, only one of six Geometry and Trigonometry skill/knowledge elements—"Perimeter, Area, and Volume: Solve Problems"—met the criterion. For the math subsample, no element met the criterion, and for the science subsample, only "Perimeter, Area, and Volume: Solve Problems" did. While these results may suggest low or even perhaps inadequate emphasis on these Geometry and Trigonometry skill/knowledge elements in high school instruction, it should be remembered that the elements in this area tend to be either restricted to single courses (in the case of geometry) or limited to advanced secondary courses (in the case of trigonometry elements).

Considering the four math content domains at the high school level, we observe strong emphasis on both Algebra and Advanced Math skill/knowledge elements from math teachers. In Problem-Solving and Data Analysis and in Geometry and Trigonometry,

emphasis is less comprehensive. These element-level findings align strongly with content domain rank ordering data supplied by math respondents and analyzed in more detail at the end of this section. Moreover, as is shown in the next subsection, middle school/junior high school math subsample results significantly lessen concerns about lack of coverage across grades 6–12 in Problem-Solving and Data Analysis and in Geometry and Trigonometry.

Middle School/Junior High School

Figure 16 displays the middle school/junior high school results for the Algebra content domain.

	Overall (*n* = 408*)				Math (*n* = 388*)				Science (*n* = 20*)			
	Instructional Level				Instructional Level				Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Linear Equations: Interpret Variables, Constants, and Terms	29%	59% ✓	7%	5%	30%	59% ✓	7%	4%	15%	45% ✓	10%	30%
Linear Equations: Solve	27%	56% ✓	7%	10%	28%	58% ✓	7%	8%	10%	25% ✗	10%	55%
Systems of Linear Equations: Solve	30%	39% ✓	4%	27%	31%	40% ✓	4%	24%	15%	10% ✗	0%	75%
Linear Equations: Graph	28%	57% ✓	4%	11%	29%	58% ✓	4%	9%	10%	35% ✓	5%	50%
Systems of Linear Equations and Inequalities: Graph	33%	33% ✓	4%	30%	34%	34% ✓	4%	28%	10%	10% ✗	10%	70%
Linear Expressions, Equations, or Inequalities: Represent Contexts	27%	52% ✓	6%	15%	28%	54% ✓	5%	12%	15%	15% ✗	10%	60%
Function Notation: Use and Interpret	28%	36% ✓	6%	31%	28%	37% ✓	6%	29%	10%	10% ✗	5%	75%

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 16. **Math Skill/Knowledge Elements: Middle School/Junior High School Respondents—Algebra Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall middle school/junior high school math sample and the math subsample, all seven Algebra skill/knowledge elements met the criterion. In the science subsample, only two elements met the criterion: "Linear Equations: Interpret Variables, Constants, and Terms" and "Linear Equations: Graph." In general terms, the findings indicate strong emphasis on Algebra skills and knowledge in middle school/junior high school math instruction.

Figure 17 displays the middle school/junior high school results for the Advanced Math content domain.

Skill/Knowledge Element	Overall (*n* = 408*)				Math (*n* = 388*)				Science (*n* = 20*)			
	Instructional Level				Instructional Level				Instructional Level			
	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Quadratic and Exponential Equations: Interpret Variables, Constants, and Terms	34%	30% ✗	4%	31%	35%	30% ✗	4%	30%	15%	30% ✗	0%	55%
Polynomials: Add, Subtract, and Multiply	36%	25% ✗	4%	35%	37%	25% ✗	4%	34%	10%	20% ✗	10%	60%
Polynomials: Factor	35%	21% ✗	3%	41%	37%	22% ✗	3%	39%	5%	15% ✗	5%	75%
Quadratic Equations: Solve	37%	16% ✗	3%	45%	38%	16% ✗	3%	43%	15%	10% ✗	0%	75%
Rational and Radical Equations: Solve	27%	30% ✗	4%	39%	28%	31% ✗	4%	37%	10%	10% ✗	5%	75%
Systems of Linear and Nonlinear Equations: Solve	24%	22% ✗	2%	52%	24%	23% ✗	2%	51%	11%	11% ✗	0%	79%
Polynomial Equations: Graph	29%	18% ✗	3%	50%	30%	18% ✗	3%	49%	5%	15% ✗	5%	75%
Exponential Equations: Graph	32%	20% ✗	5%	44%	32%	20% ✗	4%	43%	15%	20% ✗	10%	55%
Quadratic and Exponential Equations: Represent Contexts	31%	19% ✗	3%	47%	32%	20% ✗	3%	46%	15%	10% ✗	0%	75%
Quadratic and Exponential Equations: Equivalent Forms	29%	17% ✗	2%	51%	30%	18% ✗	2%	50%	10%	10% ✗	0%	80%
Equations: Isolate Variables	30%	50% ✓	6%	14%	31%	51% ✓	6%	12%	15%	20% ✗	10%	55%

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 17. **Math Skill/Knowledge Elements: Middle School/Junior High School Respondents—Advanced Math Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

In the Advanced Math content domain, only one skill/knowledge element—"Equations: Isolate Variables"—met the criterion for any group, doing so for both the overall middle school/junior high school sample and the math subsample. The findings suggest low emphasis on Advanced Math skill/knowledge elements in middle school/junior high school instruction—an unsurprising result given that, by definition, these elements are either themselves advanced math concepts or prerequisites for attaining such concepts.

Figure 18 displays the middle school/junior high school results for the Problem-Solving and Data Analysis content domain.

Skill/Knowledge Element	Overall (*n* = 408*)				Math (*n* = 388*)				Science (*n* = 20*)			
	Instructional Level				Instructional Level				Instructional Level			
	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Percentages, Proportional Relationships, Ratios, Rates, and Units: Solve Problems	18%	61% ✓	13%	8%	18%	62% ✓	13%	7%	15%	45% ✓	15%	25%
Linear and Exponential Growth: Identify and Distinguish Between	31%	31% ✗	4%	34%	32%	31% ✗	4%	34%	15%	35% ✓	15%	35%
Statistical Graphs: Read and Interpret	18%	59% ✓	7%	15%	18%	59% ✓	8%	16%	20%	65% ✓	5%	10%
Scatterplots: Model Statistical Data with a Linear Function	22%	49% ✓	5%	24%	22%	50% ✓	4%	24%	20%	30% ✗	10%	40%
Measures of Center: Solve Problems	14%	52% ✓	16%	19%	14%	52% ✓	16%	18%	15%	50% ✓	5%	30%
Measures of Spread: Solve Problems	19%	40% ✓	9%	32%	19%	41% ✓	9%	30%	10%	20% ✗	0%	70%
Probability: Solve Problems	9%	45% ✓	12%	34%	9%	46% ✓	12%	33%	0%	35% ✓	5%	60%
Sample Statistics and Population Parameters: Solve Problems	12%	37% ✓	7%	44%	12%	37% ✓	7%	43%	10%	25% ✗	5%	60%
Characteristics of Well-Designed Studies: Understand	11%	28% ✗	6%	55%	11%	27% ✗	6%	56%	10%	40% ✓	5%	45%
Margin of Error: Interpret	13%	17% ✗	4%	66%	13%	17% ✗	4%	66%	10%	20% ✗	10%	60%

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 18. **Math Skill/Knowledge Elements: Middle School/Junior High School Respondents—Problem-Solving and Data Analysis Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

In the overall middle school/junior high school math sample, seven of the ten Problem-Solving and Data Analysis elements met the criterion, with only "Linear and Exponential Growth: Identify and Distinguish Between," "Characteristics of Well-Designed Studies: Understand," and "Margin of Error: Interpret" falling below the criterion. These same three elements were also the only ones to fall below the criterion for the math subsample. In the science subsample, six of ten elements met the criterion; these included "Linear and Exponential Growth" and "Characteristics of Well-Designed Studies" (but not "Margin of Error"). Across the math and science subsamples, all but one skill/knowledge element—"Margin of Error"—was emphasized by one or both groups. Overall, the findings suggest strong emphasis on Problem-Solving and Data Analysis skill/knowledge elements in middle school/junior high school instruction.

Since Problem-Solving and Data Analysis was previously noted as an area of weaker coverage at the high school level, it's useful to compare results from high school respondents to those from middle school/junior high school respondents. Figure 19 displays the findings comparatively, focusing solely on the respective math subsamples.

	HS Math (*n* = 1,853*)				MS/JH Math (*n* = 388*)			
	Instructional Level				Instructional Level			
Skill/Knowledge Element	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Percentages, Proportional Relationships, Ratios, Rates, and Units: Solve Problems	19%	33% ✓	20%	29%	18%	62% ✓	13%	7%
Linear and Exponential Growth: Identify and Distinguish Between	22%	39% ✓	13%	26%	32%	31% ✗	4%	34%
Statistical Graphs: Read and Interpret	20%	33% ✓	9%	38%	18%	59% ✓	8%	16%
Scatterplots: Model Statistical Data with a Linear Function	21%	33% ✓	10%	36%	22%	50% ✓	4%	24%
Measures of Center: Solve Problems	16%	26% ✗	11%	48%	14%	52% ✓	16%	18%
Measures of Spread: Solve Problems	18%	24% ✗	5%	53%	19%	41% ✓	9%	30%
Probability: Solve Problems	18%	26% ✗	7%	49%	9%	46% ✓	12%	33%
Sample Statistics and Population Parameters: Solve Problems	19%	19% ✗	4%	58%	12%	37% ✓	7%	43%
Characteristics of Well-Designed Studies: Understand	19%	16% ✗	3%	62%	11%	27% ✗	6%	56%
Margin of Error: Interpret	21%	15% ✗	3%	60%	13%	17% ✗	4%	66%

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 19. **Math Skill/Knowledge Elements: Problem-Solving and Data Analysis Content Domain, High School (HS) and Middle School/Junior High School (MS/JH) Math Subsamples—Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

As this figure makes more evident, all but two Problem-Solving and Data Analysis skill/knowledge elements—"Characteristics of Well-Designed Studies: Understand" and "Margin of Error: Interpret"—met the criterion for one or both institutional subsamples. This suggests that between the two institutional levels, most Problem-Solving and Data Analysis elements are emphasized in secondary math instruction.

Finally, figure 20 displays the middle school/junior high school results for the Geometry and Trigonometry content domain.

Skill/Knowledge Element	Overall (*n* = 408*)				Math (*n* = 388*)				Science (*n* = 20*)			
	Instructional Level				Instructional Level				Instructional Level			
	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught	Honors/Advanced	On Grade	Review/Remedial	Not Taught
Perimeter, Area, and Volume: Solve Problems	18%	60% ✓	12%	11%	18%	61% ✓	12%	8%	11%	37% ✓	0%	53%
Angle and Line Theorems: Solve Problems	14%	39% ✓	5%	42%	15%	40% ✓	5%	40%	5%	21% ✗	0%	74%
Triangle Similarity and Congruence: Solve Problems	15%	34% ✓	4%	46%	15%	36% ✓	4%	45%	11%	11% ✗	0%	79%
Pythagorean Theorem and Properties of Special Right Triangles: Solve Problems	19%	45% ✓	6%	30%	20%	46% ✓	6%	28%	5%	16% ✗	5%	74%
Sine, Cosine, and Tangent Ratios: Solve Problems	15%	8% ✗	1%	77%	15%	8% ✗	1%	76%	11%	11% ✗	0%	79%
Circle Theorems: Solve Problems	12%	11% ✗	1%	76%	12%	11% ✗	1%	76%	11%	11% ✗	0%	79%

Percentages may not sum to 100 due to rounding.

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 20. **Math Skill/Knowledge Elements: Middle School/Junior High School Respondents—Geometry and Trigonometry Content Domain, Elements Taught Formally and at What Instructional Level, or Not Taught Formally.**

For the overall middle school/junior high school math sample, four of six Geometry and Trigonometry skill/knowledge elements met the criterion, while two others—"Sine, Cosine, and Tangent Ratios: Solve Problems" and "Circle Theorems: Solve Problems"—didn't. The same pattern held for the math subsample, while only "Perimeter, Area, and Volume: Solve Problems" met the criterion in the science subsample. Given that "Sine, Cosine, and Tangent Ratios" is a trigonometry concept and "Circle Theorems" an advanced concept, the fact that these two elements aren't emphasized at this instructional level is not surprising.

As with the Problem-Solving and Data Analysis content domain, Geometry and Trigonometry shows some notable variation by institutional level. Figure 21 displays the side-by-side comparison of the high school and middle school/junior high school math subsamples for this content domain.

Skill/Knowledge Element	HS Math (*n* = 1,853*) Instructional Level: Honors/Advanced	On Grade	Review/Remedial	Not Taught	MS/JH Math (*n* = 388*) Instructional Level: Honors/Advanced	On Grade	Review/Remedial	Not Taught
Perimeter, Area, and Volume: Solve Problems	20%	32% ✗	17%	31%	18%	61% ✓	12%	8%
Angle and Line Theorems: Solve Problems	12%	25% ✗	8%	55%	15%	40% ✓	5%	40%
Triangle Similarity and Congruence: Solve Problems	13%	25% ✗	9%	54%	15%	36% ✓	4%	45%
Pythagorean Theorem and Properties of Special Right Triangles: Solve Problems	21%	31% ✗	14%	34%	20%	46% ✓	6%	28%
Sine, Cosine, and Tangent Ratios: Solve Problems	27%	31% ✗	8%	34%	15%	8% ✗	1%	76%
Circle Theorems: Solve Problems	15%	23% ✗	6%	56%	12%	11% ✗	1%	76%

* The listed *n*-counts represent the fewest number of respondents who responded to the relevant survey items.

Figure 21. **Math Skill/Knowledge Elements: Geometry and Trigonometry Content Domain, High School (HS) and Middle School/Junior High School (MS/JH) Math Subsamples—Elements Taught Formally and at What Instructional Level, or Not Taught Formally**

From this display, we observe that the seeming weakness in emphasis of high school math coverage of skill/knowledge elements in this domain is counterbalanced somewhat by the greater coverage in middle school/junior high school math. Across the two institution levels, in fact, only two elements—"Sine, Cosine, and Tangent Ratios: Solve Problems" and "Circle Theorems: Solve Problems"—are not emphasized. As previously noted, these two concepts are advanced and their coverage likely appropriately limited to high-level secondary math classes.

Considering the four content domains at the middle school/junior high school level, we again observe strong emphasis on skill/knowledge elements in the Algebra domain. Advanced Math elements received less emphasis, likely due to their status as either advanced concepts or prerequisites to attaining such concepts. Problem-Solving and Data Analysis generally received strong emphasis, as did Geometry and Trigonometry (with the exception of two elements reserved for more advanced study). Further, direct comparisons between the high school math and middle school/junior high school math subsamples indicate that coverage of certain elements in the Problem-Solving and Data Analysis and in the Geometry and Trigonometry content domains is distributed across institutional levels, with some elements meeting the criterion at one level even when not doing so at the other.

ADDITIONAL MATH AND MATH-RELATED SKILLS AND KNOWLEDGE

Table 10 provides an overview of the open-ended comments from secondary math respondents to the prompt for additional math and math-related skills and knowledge.

Table 10. **Math Skill/Knowledge Elements: Secondary Respondents—Additional Skill/Knowledge Elements (Open-Ended Comments).**

Category	Operational Definition	Freq	Illustrative Comments
Algebra Skills	Ability to manipulate algebraic expressions and equations, including solving linear and quadratic equations, factoring, and working with exponents and radicals	250	"I teach solving proportions to students." – Middle school/junior high school, math "I am often getting students who were not proficient in 7th or 8th grade math, doing a lot of reviews and filling in gaps from that curriculum to help students understand Algebra I and be able to move on to the next math level." – High school, math
Functions and Graphs	Understanding of functions, coordinate systems, graphing, and interpretation of graphical relationships	216	"Knowledge of and ability to use positive and negative numbers. Finding the line between two points. Finding the line given a point and slope. Find the line given slope and *y*-intercept. Graph all types of lines." – High school, math "Answering all problems in context. Understanding the meaning of the slope as rate of change and the intercept as initial value." – High school, math
Problem-Solving and Quantitative Reasoning	Applying logical and mathematical reasoning to interpret, analyze, and solve multistep or real-world problems	137	"Problem-solving ability is key. Students need to know how to use math to solve real-world problems and apply [math] to real-life situations." – Middle school/junior high school, math "Solve application problems involving polynomials, rational and radical functions, exponential functions, and trigonometric functions. Model situations using one of these types of functions." – High school, math
Statistics and Data Analysis	Interpreting, analyzing, and representing data using statistical measures and visual displays	126	"Correlation and regression, binomial distribution, normal distribution, confidence intervals." – High school, math "Statistics, trigonometry, and AP Statistics." – High school, math
Geometry and Measurement	Knowledge of geometric properties, formulas, measurement, and spatial reasoning	119	"Exponents and logarithms. Trigonometric identities (Pythagorean, double-angle, power reducing, quotient, reciprocal identities, etc.). Solving trig equations. Modeling with trig functions." – High school, math "Focus [on] conceptual understanding, function transformations, inverse functions, logarithmic functions, unit circle, graphing trig functions, modeling with trig functions." – High school, math
Arithmetic and Numeracy	Mastery of basic number operations, fractions, decimals, percentages, ratios, proportional reasoning, and estimation	92	"Without a calculator, reinforcement of basic arithmetic skills, orders of operations." – High school, math "Numeracy skills." – High school, math

Table 10 (continued)

Category	Operational Definition	Freq	Illustrative Comments
Study Skills and Habits for Math	Strategies that support math learning, such as regular practice, organization, persistence, and self-review	75	"Students have to also be able to collaborate with each other as they are solving math problems." – Middle school/junior high school, math "Students need to be able to read critically." – High school, math
Math Vocabulary and Symbol Sense	Understanding and correct use of mathematical terminology, symbols, and notation	49	"Note-taking and vocabulary building." – Middle school/junior high school, math "The ability to prove theorems. Use mathematical vocabulary and notation. Mathematical modeling of real-world data." – High school, math
Technology Use in Math	Appropriate use of calculators, software, and digital tools, balanced with conceptual understanding	39	"I try to teach my students *not* to rely on Chromebooks and calculators to solve their math. Technology has become a serious detriment to teaching math. Students are learning less while using technology more." – Middle school/junior high school, math "How to use [the] Desmos [graphing calculator]." – High school, math
Uncategorized	Comments too vague, idiosyncratic, or not clearly fitting the above categories	188	

Apart from "technology use in math" and "study skills and habits for math," these comments largely reiterated skill/knowledge elements already present in the survey. Algebra led the list with the most comments, as was the case for the postsecondary math respondents.

Rank Ordering of Math Content Domains

Postsecondary and secondary respondents who rated the math skill/knowledge elements were also asked to rank order the four SAT Suite Math content domains (described in general academic terms rather than using test specifications language) with respect to those domains' relative importance for success in the courses/classes they'd identified. It should be noted that, by definition, the data collected reflect relative rather than absolute importance of these content domains; in other words, these findings shouldn't be interpreted as respondents' assessments of the inherent value (or lack thereof) of a given domain, only comparative value. Moreover, as always with this survey, importance is defined in terms of the courses/classes respondents identified and not (or at least not intended to be) based on general perceptions of the math discipline.

For these questions, the four content domains were presented to respondents as drag-and-drop options in the survey instrument. Table 11 indicates the percentage of respondents in various categories who indicated that a given content domain was most important (i.e., ranked 1 of 4). In the leftmost column, (parenthetical) text in the first three rows indicates the name of the corresponding SAT Suite Math section content domain; "geometry and trigonometry" (fourth row) was both the generic domain description and the name of the matching SAT Suite domain. The table's columns add up approximately to 100, with some allowance for rounding, and supplementary lavender shading and a star (★) and green shading and a diamond (♦) are used to further denote the highest- and lowest-proportion responses, respectively.

Table 11. **Math Content Domains: Percentages of Respondents Ranking Each Domain as Most Important (Rank 1 of 4).**

Content Domain Description (SAT Suite Name)	% of Respondents Ranking Each Content Domain as Most Important (Rank 1 of 4)*								
	Postsecondary Respondents			Secondary Respondents					
				High School			Middle School/Junior High School		
	Overall (*n* = 839)	Math (*n* = 580)	Science (*n* = 259)	Overall (*n* = 2,345)	Math (*n* = 1,627)	Science (*n* = 718)	Overall (*n* = 363)	Math (*n* = 344)	Science (*n* = 19)
Algebra of Linear Relationships (Algebra)	★ 66%	★ 72%	★ 54%	★ 54%	★ 54%	★ 56%	★ 80%	★ 83%	37%
Algebra of Nonlinear Relationships (Advanced Math)	10%	12%	6%	16%	21%	5%	9%	9%	◆ 0%
Statistics and Probability (Problem-Solving and Data Analysis)	15%	◆ 6%	36%	20%	13%	35%	9%	6%	★ 63%
Geometry and Trigonometry	◆ 9%	11%	◆ 3%	◆ 10%	◆ 12%	◆ 3%	◆ 2%	◆ 2%	◆ 0%

* Percentages in columns may not sum to 100 due to rounding.

As shown in table 11, "algebra of linear relationships," which corresponds to the SAT Suite Math section's Algebra content domain, was assigned rank 1 by majorities across all institutional levels and subject areas with the exception of the middle school/junior high school science subsample, which ranked "statistics and probability," corresponding to the SAT Suite Math section's Problem-Solving and Data Analysis domain, at position 1 roughly twice as frequently as "algebra of linear relationships" (63 percent and 37 percent, respectively). Conversely, "geometry and trigonometry" was assigned rank 1 by the lowest proportions of respondents across all institutional levels and subject areas with the exception of the postsecondary math subsample, which assigned it rank 1 more frequently than "statistics and probability" (11 percent and 6 percent, respectively) but still relatively infrequently overall.

This consensus around the relative importance of "algebra of linear relationships" and the relative deemphasis on "geometry and trigonometry" is broadly consistent with the design of the Math sections of the various SAT Suite tests, which place strong emphasis on the Algebra content domain relative to the Geometry and Trigonometry/Geometry domain, as noted in table 12, which displays the distribution of Math section content by content domain and testing program(s).

Table 12. **SAT Suite Math Section Content Domains: Distribution of Test Questions by Domain, by Testing Program(s).**

SAT Suite Content Domain	SAT Suite Testing Program(s)		
	SAT	PSAT/NMSQT and PSAT 10	PSAT 8/9
Algebra	≈35%	≈35%	≈42.5%
Advanced Math	≈35%	≈32.5%	≈20%
Problem-Solving and Data Analysis	≈15%	≈20%	≈25%
Geometry and Trigonometry/ Geometry (PSAT 8/9)	≈15%	≈12.5%	≈12.5%

Postsecondary and Secondary Respondent Comparisons

Although both postsecondary and secondary respondents were asked to respond to the same sets of literacy and math skill/knowledge elements, the framing questions, as previously discussed, were distinct: While postsecondary respondents were asked to consider the elements as prerequisites for success in the entry-level, credit-bearing college courses they'd identified, secondary respondents were asked to indicate whether the elements were taught or not taught in the high school and (only for math) middle school/junior high school classes they'd identified and, if taught, at what instructional level (honors/advanced, on grade level, review/remedial). While this difference in framing makes direct comparison of postsecondary and secondary data fraught, we can consider the extent to which secondary respondents reported teaching (or not teaching) the skill/knowledge elements in relation to how postsecondary respondents rated those elements in terms of importance.

We elected to compare, in literacy, the overall postsecondary ELAL sample to the overall secondary ELAL sample given that expected student literacy outcomes are generally consistent, at least in broad strokes, across subject areas and, in math, the postsecondary math subsample to the high school and middle school/junior high school math subsamples on the grounds that the articulation of outcomes by math subject matter experts would be most relevant in terms of evaluating curricular cohesion. We begin with literacy and then continue to math.

LITERACY

Table 13 displays the literacy skill/knowledge elements, arranged in descending value of the overall postsecondary ELAL sample's mean importance ratings, alongside the taught/not taught data from the overall secondary ELAL sample. Skill/knowledge elements are additionally labeled by the parenthetical (abbreviation) of the SAT Suite content domain to which they belong, with a legend appearing below the table that spells out those abbreviations.

In terms of evaluative criteria, we follow the same general guidelines as employed previously:

Postsecondary respondents

Element is "important" (rated 2.5+ in terms of mean importance)

Secondary respondents

(1) Element has a "taught on grade" percentage of ≥ 33 *and*

(2) Element has a "not taught" percentage of ≤ 15

Cells in the "overall postsecondary ELAL sample mean importance rating" (postsecondary criterion), taught "on grade" (secondary criterion 1), and "not taught" columns (secondary criterion 2) are shaded and contain symbols indicating whether the given criterion was met (blue, ✓) or not met (orange; ✘).

Table 13. **Literacy Skill/Knowledge Elements: Comparison of Overall Postsecondary ELAL Sample Mean Importance Ratings and Overall Secondary ELAL Sample Taught/Not Taught Percentages.**

Skill/Knowledge Element	Overall Postsecondary ELAL Sample Mean Importance Rating	Overall Secondary ELAL Sample: Percent Taught at Various Instructional Levels, or Not Formally Taught*			
		Honors/ Advanced	On Grade	Review/ Remedial	Not Taught
Explicit Information (INI)	3.8 ✓	43%	46% ✓	9%	3% ✓
Main Ideas, Central Claims, and Themes (INI)	3.8 ✓	41%	47% ✓	7%	5% ✓
Inferences and Conclusions (INI)	3.7 ✓	45%	46% ✓	7%	3% ✓
Text Purpose (CAS)	3.6 ✓	39%	47% ✓	6%	7% ✓
Write Logical Arguments (ESA)	3.5 ✓	45%	44% ✓	7%	3% ✓
Write Informative/Explanatory Texts (ESA)	3.5 ✓	39%	46% ✓	8%	7% ✓
Textual Evidence (INI)	3.5 ✓	44%	45% ✓	7%	4% ✓
Text Point of View/Perspective (CAS)	3.4 ✓	38%	45% ✓	6%	11% ✓
Appropriate Verb Tense/Aspect (SEC)	3.4 ✓	18%	36% ✓	16%	30% ✘
Subject-Verb Agreement (SEC)	3.4 ✓	21%	40% ✓	15%	24% ✘
End-of-Sentence Punctuation (SEC)	3.4 ✓	24%	43% ✓	14%	19% ✘
Text Synthesis (Paired Texts) (CAS)	3.3 ✓	41%	42% ✓	8%	9% ✓
Transitions (EOI)	3.3 ✓	32%	45% ✓	10%	13% ✓
Text Structure: Overall (CAS)	3.3 ✓	38%	44% ✓	8%	9% ✓
Verbs and Verbals Use (SEC)	3.3 ✓	17%	34% ✓	15%	34% ✘
Text Structure: Part-Whole Relationships (CAS)	3.3 ✓	38%	44% ✓	8%	11% ✓
Modifying Elements (SEC)	3.3 ✓	19%	36% ✓	15%	31% ✘
Plural and Possessive Nouns and Pronouns (SEC)	3.3 ✓	18%	37% ✓	16%	30% ✘
Possessive Determiners (SEC)	3.3 ✓	18%	38% ✓	18%	26% ✘
Analyze Arguments: Use of Evidence (ESA)	3.3 ✓	40%	41% ✓	8%	11% ✓
Analyze Arguments: Use of Logical Reasoning (ESA)	3.3 ✓	39%	39% ✓	8%	13% ✓
List and Clause Punctuation (SEC)	3.2 ✓	22%	41% ✓	14%	23% ✘
Arrangement of Words, Phrases, and Clauses (EOI)	3.1 ✓	34%	39% ✓	10%	17% ✘
High-Utility Academic Vocabulary Meaning (CAS)	3.1 ✓	41%	46% ✓	9%	4% ✓
Quantitative Evidence (INI)	3.0 ✓	37%	38% ✓	9%	16% ✘
Analyze Arguments: Use of Stylistic and Persuasive Elements (ESA)	2.9 ✓	38%	36% ✓	8%	18% ✘
High-Utility Academic Vocabulary Use (CAS)	2.9 ✓	42%	43% ✓	10%	5% ✓
Punctuation for Supplementary Information (SEC)	2.9 ✓	23%	38% ✓	12%	26% ✘
Unnecessary Punctuation (SEC)	2.9 ✓	21%	37% ✓	14%	28% ✘

* Percentages may not sum to 100 due to rounding.

Legend

INI: Information and Ideas
CAS: Craft and Structure
EOI: Expression of Ideas
SEC: Standard English Conventions
ESA: Essay (Argument Analysis)

As shown in table 13, all twenty-nine literacy skill/knowledge elements met the postsecondary criterion as well as secondary criterion 1. Thirteen elements, however, failed to meet secondary criterion 2. Ten of these elements came from the Standard English Conventions (SEC) content domain; in fact, no Conventions element met secondary criterion 2. This suggests that while postsecondary educators consider students' mastery of core Standard English conventions important as course success prerequisites, these elements are frequently not formally taught by secondary respondents, indicating a potential source of misalignment. At the same time, and as previously noted, some literacy pedagogies may eschew "formal" lessons in Standard English conventions in favor of opportunistic teaching moments, particularly in the context of students' own writing, as such incidents arise in day-to-day instruction. It's also potentially the case that we observe relatively low rates of formal teaching of these elements in high school because many state academic standards documents presume that most if not all conventions will have been taught by no later than the end of middle school/junior high school.

The other three skill/knowledge elements that failed to meet secondary criterion 2 were spread across the remaining content domains: "Arrangement of Words, Phrases, and Clauses" (Expression of Ideas [EOI]; 17 percent "not taught"), "Quantitative Evidence" (Information and Ideas [INI]; 16 percent), and "Analyze Arguments: Use of Stylistic and Persuasive Elements" (Essay [ESA]; 18 percent). It should be noted that these elements are "not taught" at rates lower than that for even the most frequently taught Standard English Conventions element. In addition, the response to "Quantitative Evidence" may have been somewhat depressed by the fact that the survey item asked about students' use of such evidence in relation to claims, hypotheses, and points made *in texts*, which could account for the otherwise lower-than-expected rating here when we examine the science subsample, which contributes to the overall sample's value.

The overall picture that emerges is one of general alignment between postsecondary literacy expectations and secondary literacy instruction, with the exception, previously discussed, of elements in the Standard English Conventions content domain.

MATH

Table 14 provides a similar data comparison for the math skill/knowledge elements. In this case, as noted above, we elected to compare math subsamples at the postsecondary and secondary levels rather than the overall postsecondary and secondary math samples. Skill/knowledge elements are again labeled by the parenthetical (abbreviation) of the SAT Suite content domain to which they belong, with a legend spelling out those abbreviations appearing below the table, and cells with criterion-passing and -failing results are marked as usual.

Our evaluative criteria are modified slightly from those for literacy and in line with our prior secondary-level analyses:

Postsecondary respondents

Element is "important" (rated 2.5+ in terms of mean importance)

Secondary respondents

Element has a "taught on grade" percentage of ≥ 33

Table 14. **Math Skill/Knowledge Elements: Comparison of Postsecondary Math Subsample Mean Importance Ratings and Secondary (High School, Middle School/ Junior High School) Math Subsample Taught/Not Taught Percentages.**

Skill/Knowledge Element	Postsecondary Math Subsample Mean Importance Rating	Secondary Math Subsamples: Percent Taught at Various Instructional Levels, or Not Formally Taught*							
		High School				Middle School/Junior High School			
		Honors/ Advanced	On Grade	Review/ Remedial	Not Taught	Honors/ Advanced	On Grade	Review/ Remedial	Not Taught
Linear Equations: Interpret Variables, Constants, and Terms (ALG)	3.8 ✓	26%	39% ✓	22%	14%	30%	59% ✓	7%	4%
Linear Equations: Solve (ALG)	3.8 ✓	19%	35% ✓	23%	23%	28%	58% ✓	7%	8%
Linear Equations: Graph (ALG)	3.8 ✓	19%	36% ✓	25%	21%	29%	58% ✓	4%	9%
Equations: Isolate Variables (ADM)	3.7 ✓	25%	40% ✓	20%	16%	31%	51% ✓	6%	12%
Function Notation: Use and Interpret (ALG)	3.6 ✓	25%	41% ✓	15%	20%	28%	37% ✓	6%	29%
Polynomials: Add, Subtract, and Multiply (ADM)	3.6 ✓	21%	41% ✓	15%	23%	37%	25% ✘	4%	34%
Quadratic and Exponential Equations: Interpret Variables, Constants, and Terms (ADM)	3.5 ✓	26%	41% ✓	14%	18%	35%	30% ✘	4%	30%
Polynomials: Factor (ADM)	3.5 ✓	21%	41% ✓	15%	22%	37%	22% ✘	3%	39%
Quadratic Equations: Solve (ADM)	3.5 ✓	20%	38% ✓	17%	25%	38%	16% ✘	3%	43%
Linear Expressions, Equations, and Inequalities: Represent Contexts (ALG)	3.4 ✓	25%	40% ✓	18%	17%	28%	54% ✓	5%	12%
Percentages, Proportional Relationships, Ratios, Rates, and Units: Solve Problems (PSDA)	3.2 ✓	19%	33% ✓	20%	29%	18%	62% ✓	13%	7%
Perimeter, Area, and Volume: Solve Problems (GT)	3.1 ✓	20%	32% ✘	17%	31%	18%	61% ✓	12%	8%
Systems of Linear Equations: Solve (ALG)	3.1 ✓	17%	35% ✓	23%	23%	31%	40% ✓	4%	24%
Rational and Radical Equations: Solve (ADM)	3.1 ✓	22%	37% ✓	13%	28%	28%	31% ✘	4%	37%
Pythagorean Theorem and Properties of Special Right Triangles: Solve Problems (GT)	3.1 ✓	21%	31% ✘	14%	34%	20%	46% ✓	6%	28%
Linear and Exponential Growth: Identify and Distinguish Between (PSDA)	3.0 ✓	22%	39% ✓	13%	26%	32%	31% ✘	4%	34%
Polynomial Equations: Graph (ADM)	3.0 ✓	23%	37% ✓	11%	29%	30%	18% ✘	3%	49%
Exponential Equations: Graph (ADM)	3.0 ✓	22%	40% ✓	13%	26%	32%	20% ✘	4%	43%
Quadratic and Exponential Equations: Represent Contexts (ADM)	3.0 ✓	26%	41% ✓	10%	22%	32%	20% ✘	3%	46%
Quadratic and Exponential Equations: Equivalent Forms (ADM)	2.8 ✓	25%	37% ✓	9%	28%	30%	18% ✘	2%	50%
Sine, Cosine, and Tangent Ratios: Solve Problems (GT)	2.8 ✓	27%	31% ✘	8%	34%	15%	8% ✘	1%	76%
Systems of Linear Equations and Inequalities: Graph (ALG)	2.7 ✓	15%	36% ✓	14%	36%	34%	34% ✓	4%	28%

Table 14 (continued)

Skill/Knowledge Element	Postsecondary Math Subsample Mean Importance Rating	Secondary Math Subsamples: Percent Taught at Various Instructional Levels, or Not Formally Taught*							
		High School				Middle School/Junior High School			
		Honors/ Advanced	On Grade	Review/ Remedial	Not Taught	Honors/ Advanced	On Grade	Review/ Remedial	Not Taught
Systems of Linear and Nonlinear Equations: Solve (ADM)	2.5 ✓	20%	31% ✘	10%	38%	24%	23% ✘	2%	51%
Angle and Line Theorems: Solve Problems (GT)	2.4 ✘	12%	25% ✘	8%	55%	15%	40% ✓	5%	40%
Triangle Similarity and Congruence Theorems: Solve Problems (GT)	2.4 ✘	13%	25% ✘	9%	54%	15%	36% ✓	4%	45%
Statistical Graphs: Read and Interpret (PSDA)	2.3 ✘	20%	33% ✓	9%	38%	18%	59% ✓	8%	16%
Circle Theorems: Solve Problems (GT)	2.3 ✘	15%	23% ✘	6%	56%	12%	11% ✘	1%	76%
Scatterplots: Model Statistical Data with a Linear Function (PSDA)	2.1 ✘	21%	33% ✓	10%	36%	22%	50% ✓	4%	24%
Measures of Center: Solve Problems (PSDA)	1.9 ✘	16%	26% ✘	11%	48%	14%	52% ✓	16%	18%
Measures of Spread: Solve Problems (PSDA)	1.8 ✘	18%	24% ✘	5%	53%	19%	41% ✓	9%	30%
Probability: Solve Problems (PSDA)	1.8 ✘	18%	26% ✘	7%	49%	9%	46% ✓	12%	33%
Sample Statistics and Population Parameters: Solve Problems (PSDA)	1.7 ✘	19%	19% ✘	4%	58%	12%	37% ✓	7%	43%
Characteristics of Well-Design Studies: Understand (PSDA)	1.7 ✘	19%	16% ✘	3%	62%	11%	27% ✘	6%	56%
Margin of Error: Interpret (PSDA)	1.7 ✘	21%	15% ✘	3%	60%	13%	17% ✘	4%	66%

*Percentages may not sum to 100 due to rounding.

Legend

ALG: Algebra
ADM: Advanced Math
PSDA: Problem-Solving and Data Analysis
GT: Geometry and Trigonometry

Twenty-three math skill/knowledge elements met the postsecondary criterion, meaning these elements were considered important by postsecondary math instructors. Of these, only two—"Sine, Cosine, and Tangent Ratios: Solve Problems" in Geometry and Trigonometry and "Systems of Linear and Nonlinear Equations: Solve" in Advanced Math—failed to be emphasized (i.e., didn't meet the secondary criterion) at either secondary institution level.

Considering the inverse case, we observe that eleven math skill/knowledge elements were considered unimportant by the postsecondary math subsample. Of these, eight were rated emphasized by one or both secondary institutional levels: six at the middle school/junior high school level only and two at both levels.

Generally speaking, we observe, first, that nearly all elements rated important by the postsecondary math subsample were rated emphasized by the high school math subsample, the middle school/junior high school math subsample, or both and, second, that several elements rated unimportant by the postsecondary math subsample were still rated emphasized by the high school math and/or junior high school math subsamples. We conjecture that these latter elements are included in secondary math curricula for the purposes of discipline cohesion.

4. Additional Findings

College Board used the opportunity of the curriculum survey to ask additional questions of its educator audience. In order of presentation below, these topics consisted of (1) typical allocation of instructional time in the courses postsecondary respondents had identified, (2) the instructional level (on grade level, below grade level, above grade level) at which the classes secondary respondents had identified are typically taught, and (3) respondents' general impressions of their students' college readiness. Respondents were also given an opportunity to supply open-ended feedback on students' college readiness as well as final comments, both of which are summarized below.

Typical Allocation of Instructional Time

Postsecondary respondents were asked to indicate how they typically divide up instructional time in the courses they'd identified in relation to common literacy- and math-related activities, as appropriate. Presented with lists of such activities, respondents were directed to allocate a hypothetical 100 percent of typical instructional time among them, with the survey app validating that the results added up to 100.

Table 15 (literacy) and table 16 (math) display postsecondary respondents' time allocations. Supplemental shading and symbols indicate the highest (lavender, star [★]) and the lowest (green, diamond [♦]) proportional responses.

Table 15. **Literacy: Percentage of Time Allocated to Various Instructional Activities by Postsecondary Respondents.**

Activity	Postsecondary Respondents*				
	Overall (*n* = 1,463)	English (*n* = 360)	Humanities (Other than English) (*n* = 463)	Social Science (*n* = 352)	Science (*n* = 288)
Reading	★ 23%	20%	★ 24%	★ 25%	★ 24%
Writing/composition	21%	★ 32%	20%	17%	13%
Presenting (e.g., speeches, debates, slide shows)	11%	♦ 6%	12%	13%	13%
Discussions (e.g., whole-class, small-group)	21%	24%	21%	22%	17%
Language study (e.g., grammar, usage)	♦ 6%	7%	♦ 8%	♦ 3%	♦ 3%
Research	10%	10%	9%	12%	12%
Other	8%	2%	6%	8%	19%

* Percentages in columns may not sum to 100 due to rounding.

As shown in table 15, the overall postsecondary ELAL sample reported spending the most instructional time on reading (23 percent), followed closely by writing/composition and discussion (21 percent each) and then by presenting (11 percent), research (10 percent), and language study (6 percent), with "other" at 8 percent. Reading was the most frequent literacy activity for all subsamples but that of postsecondary English, which reported giving more instructional time to writing/composition (32 percent, versus 20 percent for reading). Of the various activities, excluding "other," language study received the lowest proportion of instructional time from the overall postsecondary ELAL sample (6 percent) and from the humanities (other than English; 8 percent), social science (3 percent), and science subsamples (3 percent) and, at 7 percent, just edged out presenting (6 percent) from the English subsample.

Table 16. **Math: Percentage of Time Allocated to Various Instructional Activities by Postsecondary Respondents.**

Activity	Postsecondary Respondents*		
	Overall (*n* = 860)	Math (*n* = 593)	Science (*n* = 267)
Direct instruction or lecture	★ 47%	★ 54%	★ 34%
Whole-class demonstration or discussion	14%	14%	13%
Small-group discussion	9%	9%	9%
Small-group investigation/lab	11%	7%	19%
Individual practice	12%	12%	12%
Individual self-paced learning	♦ 5%	♦ 4%	♦ 8%
Other	3%	1%	7%

* Percentages in columns may not sum to 100 due to rounding.

Per table 16, the overall postsecondary math sample (47 percent) as well as the math and science subsamples (54 percent and 34 percent, respectively) reported allocating the most instructional time to direct instruction or lecture and the least amount of time to individual self-paced learning (3 percent, 1 percent, and 7 percent, respectively). For both the overall postsecondary math sample and the math subsample, direct instruction or lecture constituted around half of all instructional time; by comparison, the science

subsample reported dedicating only about a third of instructional time this way, with proportionally more time devoted to small-group investigation/lab (19 percent, relative to 11 percent for the overall postsecondary math sample and 7 percent for the math subsample) and "other" (7 percent, relative to 3 percent and 1 percent).

Should future College Board curriculum surveys continue to pursue this line of questioning, secondary respondents will also be asked these questions to provide a basis for comparison.

Typical Instructional Level of Identified Classes

Secondary respondents were also asked whether the instruction provided in the classes they'd identified was typically on grade level, above grade level, or below grade level. This question was intended to get a holistic sense of whether respondents felt that they were teaching their classes as formally envisioned and documented (e.g., in course catalogs) or above or below those levels.

Table 17 (literacy) and table 18 (math) display the results. Supplemental shading and symbols again indicate the highest (lavender, star [★]) and lowest (green, diamond [♦]) proportional responses.

Table 17. **Literacy: Typical Instructional Level of Identified Classes.**

	Secondary Respondents*				
Identified Course Is Taught Primarily . . .	**Overall (*n* = 5,206)**	**English (*n* = 2,033)**	**Humanities (Other than English) (*n* = 131)**	**Social Science (*n* = 376)**	**Science (*n* = 750)**
Below grade level	♦ 19%	♦ 20%	♦ 18%	♦ 15%	♦ 14%
On grade level	★ 52%	★ 49%	★ 49%	★ 45%	★ 52%
Above grade level	29%	31%	34%	40%	34%

* Percentages in columns may not sum to 100 due to rounding.

Table 18. **Math: Typical Instructional Level of Identified Classes.**

	Secondary Respondents*					
	High School			Middle School/Junior High School		
Identified Course Is Taught Primarily . . .	**Overall (*n* = 2,318)**	**Math (*n* = 1,583)**	**Science (*n* = 735)**	**Overall (*n* = 348)**	**Math (*n* = 333)**	**Science (*n* = 15)**
Below grade level	♦ 18%	♦ 20%	♦ 14%	♦ 23%	♦ 23%	24%
On grade level	★ 56%	★ 57%	★ 52%	★ 53%	★ 53%	★ 57%
Above grade level	27%	23%	34%	24%	24%	♦ 19%

* Percentages in columns may not sum to 100 due to rounding.

Across both literacy and math and across all samples and subsamples, the most frequent response was "on grade level," with percentages near or slightly above 50 percent. Conversely, the least frequent response in all but one case was "below grade level," with percentages hovering around 20 percent. The lone exception was for the middle school/junior high school science subsample in math, for which "above grade level" was the least frequent response (19 percent), though this subsample's response for "below grade level," at 24 percent, was only slightly higher than that of other respondent groups.

In general terms, majorities or near-majorities of secondary ELAL and math respondents reported that the classes they'd identified were taught primarily on grade level, and a quarter or less of those respondents indicated that their classes were taught primarily below grade level.

Assessment of Students' College Readiness

QUANTITATIVE DATA

Postsecondary and secondary respondents were asked to assess the general state of "college readiness" of the students in the courses/classes they'd identified. Respondents were asked, first, to indicate the percentage of students (from a set of listed ranges) that they considered "college ready," by whatever definition they chose, and, second, to indicate the percentage of students who they felt could read an assigned text independently, with minimal structure and support, with the latter question designed to elicit a more concrete response in relation to a common college readiness activity.

Table 19 (literacy) and table 20 (math) display the results in response to the general question about students' college readiness. Supplemental shading and symbols again indicate the highest (lavender, star [★]) and lowest (green, diamond [♦]) proportional responses.

***Table 19.* Literacy: Percentage of Students Deemed "College Ready" by Postsecondary and Secondary Respondents.**

Proportion of Students Considered at Least "College Ready"	Postsecondary Respondents*					Secondary Respondents*				
	Overall (*n* = 1,086)	English (*n* = 359)	Humanities (Other than English) (*n* = 461)	Social Science (*n* = 313)	Science (*n* = 266)	Overall (*n* = 2,927)	English Language Arts (*n* = 1,726)	Humanities (Other than English) (*n* = 122)	Social Studies (*n* = 333)	Science (*n* = 746)
25 percent or less	20%	22%	24%	15%	18%	♦ 16%	♦ 17%	♦ 11%	♦ 15%	♦ 14%
26 to 50 percent	★ 34%	★ 32%	★ 32%	★ 36%	★ 39%	23%	25%	16%	20%	19%
51 to 75 percent	32%	31%	31%	★ 36%	30%	★ 32%	★ 30%	★ 40%	★ 38%	31%
76 percent or greater	♦ 14%	♦ 15%	♦ 14%	♦ 12%	♦ 13%	29%	27%	33%	27%	★ 36%

* Percentages in columns may not sum to 100 due to rounding.

***Table 20.* Math: Percentage of Students Deemed "College Ready" by Postsecondary and Secondary Respondents.**

Proportion of Students Considered at Least "College Ready"	Postsecondary Respondents*			Secondary Respondents*					
				High School			Middle School/Junior High School		
	Overall (*n* = 859)	Math (*n* = 593)	Science (*n* = 266)	Overall (*n* = 2,358)	Math (*n* = 1,955)	Science (*n* = 761)	Overall (*n* = 358)	Math (*n* = 343)	Science (*n* = 15)
25 percent or less	19%	20%	18%	♦ 17%	♦ 20%	♦ 15%	★ 28%	27%	★ 40%
26 to 50 percent	★ 36%	35%	★ 39%	21%	22%	19%	26%	26%	27%
51 to 75 percent	35%	★ 37%	30%	28%	25%	31%	♦ 18%	♦ 18%	27%
76 percent or greater	♦ 10%	♦ 8%	♦ 13%	★ 35%	★ 33%	★ 35%	★ 28%	★ 29%	♦ 7%

* Percentages in columns may not sum to 100 due to rounding.

Table 19 shows that the most frequent response from postsecondary ELAL respondents, both overall and by most subsamples, was "26 to 50 percent" of incoming

students being "college ready" (34 percent for the overall postsecondary ELAL sample and 32 percent, 32 percent, and 39 percent for the English, humanities [other than English], and science subsamples, respectively), with the postsecondary social science subsample's response being bimodal (36 percent for both "26 to 50 percent" and "51 to 75 percent"). By comparison, the overall secondary ELAL sample and subject area subsamples were more sanguine, with the most frequent response being "51 to 75 percent" (32 percent for the overall secondary ELAL sample and 30 percent, 40 percent, and 38 percent for the English, humanities, and social studies subsamples, respectively) for all but the science subsample (31 percent, while "76 percent or greater" was selected by 36 percent).

The least frequent response for the overall postsecondary ELAL sample and all subject area subsamples was "76 percent or greater," whereas the least frequent response for the overall secondary ELAL sample and all subject area subsamples was "25 percent or less." In general terms, these results suggest that secondary ELAL respondents were more optimistic in their assessments of their students' general college readiness than were postsecondary ELAL respondents in their assessments of their incoming students' readiness.

Table 20 exhibits a generally similar pattern. The most frequent response for the overall postsecondary math sample and the science subsample was "26 to 50 percent" (36 percent and 39 percent, respectively), while the most frequent response for the math subsample was "51 to 75 percent" (37 percent, compared to 35 percent for "26 to 50 percent"). By comparison, the high school math respondents' most frequent response, both for the overall sample and for the subject area subsamples, was "76 percent or greater" (35 percent for the overall high school math sample and 33 percent and 35 percent for the math and science subsamples, respectively). The overall middle school/junior high school math sample selected both "76 percent or greater" and "25 percent or less" most commonly (28 percent each), while the most frequent responses from the math and science subsamples was, respectively, "76 percent or greater" (29 percent) and "25 percent or less" (40 percent).

The least frequent response from the overall postsecondary math sample and subject area subsamples was "76 percent or greater" (10 percent for the overall sample and 8 percent and 13 percent, respectively, for the math and science subsamples), which was, in fact, the *most* frequent response from the overall high school math sample and subject area subsamples as well as for the overall middle school/junior high school math sample and math subsample, with only 7 percent of the science subsample selecting that option.

Taken together, these results suggest some degree of difference of opinion regarding students' general college readiness, with postsecondary respondents in both literacy and math taking a generally dimmer view than their secondary colleagues.

Postsecondary and secondary respondents were also asked to indicate what percentage of their students were capable of reading an assigned text independently and with understanding. This question was devised to contextualize respondents' general impressions of students' college readiness in a specific, common task. Table 21 (literacy) and table 22 (math) present the results. Supplemental shading and symbols again indicate the highest (lavender, star [★]) and lowest (green, diamond [♦]) proportional responses.

Table 21. **Literacy: Percentage of Students Deemed Able by Postsecondary and Secondary Respondents to Read an Assigned Text Independently.**

Percentage of Students Able to Read an Assigned Text Independently and with Adequate Understanding	Postsecondary Respondents*					Secondary Respondents*				
	Overall (*n* = 1,400)	English (*n* = 359)	Humanities (Other than English) (*n* = 461)	Social Science (*n* = 313)	Science (*n* = 267)	Overall (*n* = 3,365)	English Language Arts (*n* = 2,083)	Humanities (Other than English) (*n* = 133)	Social Studies (*n* = 389)	Science (*n* = 760)
25 percent or less	23%	21%	26%	21%	20%	♦ 13%	♦ 13%	♦ 4%	♦ 12%	♦ 14%
26 to 50 percent	★ 35%	★ 37%	★ 33%	★ 34%	★ 37%	26%	27%	28%	25%	24%
51 to 75 percent	30%	27%	30%	33%	31%	★ 33%	★ 33%	34%	★ 36%	★ 32%
76 percent or greater	♦ 13%	♦ 14%	♦ 12%	♦ 12%	♦ 12%	28%	27%	★ 35%	27%	30%

* Percentages in columns may not sum to 100 due to rounding.

Table 22. **Math: Percentage of Students Deemed Able by Postsecondary and Secondary Respondents to Read an Assigned Text Independently.**

Percentage of Students Able to Read an Assigned Text Independently and with Adequate Understanding	Postsecondary Respondents*			Secondary Respondents*					
				High School			Middle School/Junior High School		
	Overall (*n* = 855)	Math (*n* = 588)	Science (*n* = 267)	Overall (*n* = 2,354)	Math (*n* = 1,609)	Science (*n* = 745)	Overall (*n* = 357)	Math (*n* = 342)	Science (*n* = 15)
25 percent or less	32%	★ 37%	20%	♦ 18%	♦ 20%	♦ 13%	25%	♦ 24%	★ 40%
26 to 50 percent	★ 37%	★ 37%	★ 37%	26%	27%	24%	★ 26%	★ 26%	33%
51 to 75 percent	24%	21%	31%	★ 30%	★ 29%	★ 32%	★ 26%	★ 26%	20%
76 percent or greater	♦ 7%	♦ 5%	♦ 12%	26%	24%	30%	♦ 23%	♦ 24%	♦ 7%

* Percentages in columns may not sum to 100 due to rounding.

As shown in table 21, the most frequent response from the overall postsecondary ELAL sample and the subject area subsamples was "26 to 50 percent" (35 percent for the overall postsecondary ELAL sample and 37 percent, 33 percent, 34 percent, and 37 percent for the English, humanities [other than English], social science, and science subsamples, respectively), while the least frequent response was "76 percent or greater" (13 percent, 14 percent, 12 percent, 12 percent, 12 percent). By contrast, the most frequent response from the overall secondary ELAL sample and subject area subsamples was either "51 to 75 percent" (33 percent for the overall secondary ELAL sample and 33 percent, 36 percent, and 32 percent, respectively, for the English language arts, social studies, and science subsamples) or "76 percent or greater" (35 percent for the humanities subsample).

The least frequent postsecondary and secondary ELAL responses were mirror images. While "76 percent or greater" was the least frequent response from the overall postsecondary ELAL sample and from the English, humanities (other than English), social science, and science subsamples (13 percent, 14 percent, 12 percent, 12 percent, and 12 percent, respectively), "25 percent or less" was the least frequent response from the overall secondary ELAL sample and from the English, humanities, social studies, and science subsamples (13 percent, 13 percent, 4 percent, 12 percent, 14 percent).

Table 22 shows that the most frequent response from the overall postsecondary math sample and subject area subsamples was "26 to 50 percent" (37 percent each),

with the same proportion of the math subsample selecting "25 percent or less." By comparison, the most frequent response from the overall high school math sample and math and science subsamples was "51 to 75 percent" (30 percent, 29 percent, and 32 percent, respectively). The most frequent responses from the overall middle school/junior high school math sample and math subsample were "51 to 75 percent" and "26 to 50 percent" (26 percent each), while the most frequent response from the science subsample was "25 percent or less" (40 percent).

The least frequent response from the overall postsecondary math sample and math and science subsamples was "76 percent or greater" (7 percent for the overall sample and 5 percent and 12 percent for the math and science subsamples). By contrast, the least frequent response from the overall high school math sample and math and science subsamples was "25 percent or less" (18 percent, 20 percent, and 13 percent, respectively), roughly the mirror-image of their postsecondary counterparts. The overall middle school/junior high school math sample and math and science subsamples were more like their postsecondary colleagues than their high school ones, with the least frequent response from all three being "76 percent or greater" (23 percent, 24 percent, and 7 percent, respectively).

Taken together, these results, like those for the preceding survey item on general college readiness, suggest a broad discrepancy in views between the postsecondary and secondary levels, with postsecondary respondents again taking a less optimistic view of students' ability to read assigned texts independently than did the secondary respondents.

OPEN-ENDED COMMENTS

Postsecondary and secondary respondents also had an opportunity to supply open-ended feedback regarding their perceptions of students' college readiness. While these optionally supplied comments are anecdotal and not necessarily representative of the views of either sample as a whole, they offer some clues as to why respondents rated their respective students' college readiness as they did.

Table 23 provides an overview of the postsecondary respondents' comments.

Table 23. **Postsecondary Respondents: College Preparedness (Open-Ended Comments).**

Category	Operational Definition	Freq	Illustrative Comments
Gaps in Foundational Knowledge	Students lack mastery of basic skills in reading, writing, or mathematics preventing success in higher-level coursework	225	"Public schools are failing to teach students to read properly, think critically, or write accurately, and we at the college level are left to pick up the pieces and make some progress." – 2-year college, humanities (other than English) "Students are woefully lacking in all areas." – 4-year college, humanities
High School Preparation Concerns	Critiques of K–12 curricula, grading practices, or graduation requirements that allow underprepared students to advance	217	"Public schools tend to teach math horribly." – 4-year college, math "We have been blaming a lot of preparedness issues on COVID for several years now, but will we ever come out of this shadow, or is it the new normal?" – 4-year college, math

Table 23 (continued)

Category	Operational Definition	Freq	Illustrative Comments
Study Habits and Motivation	Concerns about effort, persistence, independence, and overall work habits	201	"Students have more trouble focusing and spending time on task now than ten years ago. I suspect this is due to phones/social media. This might be the biggest factor actually holding students back." – 4-year college, science "The inability of current students to independently read, process, and apply even simple instructions is depressing and frustrating. I cannot spend time digging into deeper topics and issues or developing advanced skills because I spend so much time walking students through even the simplest of tasks." – 2-year college, English
Communication and Expression	Inability to communicate ideas effectively in speech or writing, including argumentation and clarity	105	"The COVID kids are very different in their ability to work in groups and think critically." – 2-year college, humanities "Our students don't have any confidence in their ability to clearly communicate their ideas. This results in an overreliance on quotations and an overall lack of original substance. They also rely on memorization rather than mastery of concepts, which hurts their performance on exams if material isn't presented exactly as they memorized it." – 4-year college, social science
Weak Critical Thinking and Problem-Solving	Deficits in reasoning, logic, analysis, and application of knowledge beyond rote memorization	97	"Students are unable to focus/concentrate long enough to read one or two pages (let alone 20!) They have an extremely limited vocabulary. They are unable to sequence information (e.g., present it in chronological order)." – 4-year college, humanities "Students often know how to summarize or otherwise regurgitate ideas found elsewhere but are decidedly lacking in the ability to logically consider and express their own ideas." – 4-year college, English
Adjustment to College Expectations	Difficulties transitioning to the pace, rigor, or independence required in college-level learning	70	"As a community college instructor, the 'open door' admissions policy is something I have grown used to. However, I do spend time impressing on my students that to progress to a four-year institution, there are certain expectations they will need to meet." – 2-year college, humanities "Students want to be entertained with pretty slides and graphics. They want everything handed to them, and they do not take good notes." – 4-year college, science
Technology Overreliance	Dependence on calculators, online tools, or other technology in place of developing conceptual understanding	53	"My students' abilities are shockingly low. Most of them can barely write a sentence, let alone an entire paragraph. Essays are almost always produced by ChatGPT." – 2-year college, humanities "Helping students to become fluent with math technologies such as graphing calculators takes time away from content instruction." – 2-year college, math
Uncategorized	Comments too vague, idiosyncratic, or ambiguous to classify into one of the categories above	98	

Postsecondary respondents electing to provide open-ended comments reported numerous areas of weakness in incoming students' college readiness, including, in descending order of approximate number of comments, "gaps in foundational knowledge," "high school preparedness concerns," "study habits and motivation," "communication and expression," "weak critical thinking and problem-solving," "adjustment to college expectations," and "technology overreliance." These areas correspond to a mix of academic and "soft" skills and knowledge. Studying the comments from a slightly different perspective, we might say that the first two areas—and the most frequently called out—relate to perceived shortcomings in incoming students' prior education and preparation, while the remaining areas pertain to perceived academic and "soft" skill shortcomings in incoming students themselves.

Table 24 provides an overview of the secondary respondents' open-ended comments about their students' college readiness.

Table 24. **Secondary Respondents: College Preparedness (Open-Ended Comments).**

Category	Operational Definition	Freq	Illustrative Comments
High School Preparation Concerns	Critiques of K–12 curricula, grading practices, or graduation requirements that allow underprepared students to advance	474	"We could blame the gaps on the COVID shutdown, but our students were coming to high school unprepared for high school courses long before COVID hit." – High school, math "Basic skills are severely lacking. Many high school curriculum are focused on project-based learning and investigation. There is a serious lack of skills practice that students need." – High school, math
Gaps in Foundational Knowledge	Students lack mastery of basic skills in reading, writing, or mathematics preventing success in higher-level coursework	473	"Students are lacking in basic foundational skills when they get to my class. They are scared of working with fractions. They don't know basic math skills quickly without using a calculator." – High school, math "Most students in my regular math classes are seriously deficient in number sense and foundational algebraic skills like simplifying fractions and combining like terms." – High school, math
Study Habits and Motivation	Concerns about effort, persistence, independence, and overall work habits	318	"My students are primarily rural, and I have seen a definite decrease in [achievement] and drive over the past years. COVID or not—they are entitle[d] and want everything handed to them on a platter. Homework is a dirty word. They will not read. Cell phones have destroyed any sort of focus they could have had—they *cannot* read—and lack the ability to do so because of lack of ability to focus for any sustained period of time. They are not college ready when they leave our [high school]. They *think* they know how to study, but all they really know how to do is text." – High school, English language arts "Many students in the CP course lack the focus to read for understanding independently. Often times, students skim for lower-level information rather than read critically." – High school, English language arts

Table 24 (continued)

Category	Operational Definition	Freq	Illustrative Comments
Communication and Expression	Inability to communicate ideas effectively in speech or writing, including argumentation and clarity	210	"Most students enter high school with weak organization and writing skills. Most do not prewrite or outline their ideas before writing. Using the outlining method has helped many students be more effective in expressing themselves through their writing." – High school, English language arts "The students in my class—those [who] engage and try—exit prepared for college. It is heavily stressed that they understand they must think critically, express their ideas concisely, and seek to communicate with purpose." – High school, English language arts
Weak Critical Thinking and Problem-Solving	Deficits in reasoning, logic, analysis, and application of knowledge beyond rote memorization	155	"For my AP Statistics course, students routinely use advanced critical thinking and logical reasoning skills in order to discern the appropriate method to approaching a problem and how to answer in the most efficient way possible." – High school, math "Their biggest weakness is [learned] helplessness. They have been trained to think that math class is about copying the teacher's steps. Now they have too many procedures to memorize, and they have [few] skills for using logic and reasoning to figure out a problem. I spend most of my class unteaching things they have learned in the past." – High school, math
Adjustment to College Expectations	Difficulties transitioning to the pace, rigor, or independence required in college-level learning	139	"Not all students placed in honors classes are appropriate, as it is parents voicing their wants over students' needs, which is not preparing them for college because they are not prepared for the rigor." – Middle school/junior high school, math "I teach AP Physics 1 and AP Physics 2. My students are well prepared for the rigor of college-level courses." – High school, science
Technology Overreliance	Dependence on calculators, online tools, or other technology in place of developing conceptual understanding	77	"The middle school lets them use calculators/Desmos for everything, so I have to retrain them to do math without it." – High school, math "Students do not truly read. They tend to rely on summaries and other readily available online notes rather than actually reading the text." – High school, English language arts
Uncategorized	Comments too vague, idiosyncratic, or ambiguous to classify into one of the categories above	240	

Secondary respondents' areas of concern were comparable to those of the postsecondary respondent sample, capturing a mix of academic and "soft" skills and knowledge. Indeed, both respondent samples most frequently identified concerns about students' prior academic and "soft" skill preparation.

Final Open-Ended Comments

The literacy and math surveys gave respondents a final opportunity to share anything germane to students' skill/knowledge development and nonacademic proficiencies. Table 25 provides an overview of the comments offered by postsecondary respondents.

Table 25. **Postsecondary Respondents: Final Comments (Open-Ended Comments).**

Category	Operational Definition	Freq	Illustrative Comments
Study Skills and Time Management	Skills for independent learning including time management, note-taking, self-regulation, persistence, and help-seeking	312	"Ability to focus, ability to take notes." – 4-year college, social science "Time management, self-discipline, study skills (they do not know how to take notes on a text, for example)." – 4-year college, humanities (other than English)
Discipline-Specific Knowledge	Specific background knowledge valued in certain fields such as science, visual/media analysis, and history	125	"Statistics." – 4-year college, math "I'd like them to have more background knowledge in history, literature." – 2-year college, English
Reading and Critical Thinking	Reading comprehension, analysis, and interpretation with emphasis on applying critical thinking to texts	110	"Estimation, logic, intuition, problem-solving skills, critical thinking, etc. These are all areas that can influence the effectiveness of reading and math skills but were not approached in this survey." – 4-year college, science "Critical reading and critical thinking skills." – 4-year college, math
Mathematics and Quantitative Skills	Additional math readiness beyond basics including algebra, fractions, decimals, and quantitative reasoning	94	"Fractions. Simplifying exponents." – 4-year college, math "Working with fractions in general, working with fractional exponents (e.g., square root as the one-half power), understanding how to solve basic nonlinear equations (e.g., sin $X = 1/5$ or $2^x = 3$)." – 4-year college, math
Research and Information Literacy	Ability to locate, evaluate, and use sources effectively including awareness of media bias and misinformation	78	"At this point, I am more concerned about their social skills, how well they connect with their teacher and classmates. I also think their ability to find reliable sources of information is important." – 2-year college, science "Understand what makes a reliable research source, especially on the internet." – 4-year college, humanities
Civic and Social Awareness	Understanding of civics, social issues, current events, and responsibilities of citizenship	66	"Basic social concepts such as what are political, economic, or social issues. Causality vs. correlation. Disciplines of philosophies. Non-Western perspectives and history." – 4-year college, social science "They should have background in world and U.S. history, current events, and civics." – 4-year college, humanities

Table 25 (continued)

Category	Operational Definition	Freq	Illustrative Comments
Logic and Problem-Solving	Foundational skills in reasoning, logic, estimation, and problem-solving across domains	65	"How to solve problems independently. Students are entirely too dependent on instructional guidance; it's like a form of learned/weaponized helplessness." – 4-year college, social science "Critical thinking skills in general. Students [want] a step-by-step process and cannot take the step to solve a problem that's slightly different than what you gave them." – 4-year college, math
Communication and Interpersonal Skills	Ability to communicate clearly in writing and speech, engage in face-to-face conversations, and collaborate effectively	61	"Critical thinking, problem-solving, ability to take initiative, courage, public speaking, small-group dynamics and teamwork." – 2-year college, social science "Oral communication skills. The College Board focuses on language as written text." – 4-year college, humanities
Technology and Digital Literacy	Proficiency in using technology for learning including computers (not just phones), software, and online navigation	59	"Digital literacy and using technology to produce written texts; use and abuse of generative AI; ethics of writing." – 4-year college, English "Proper understanding of how to use technology like search engines, databases, generative AI, etc. They use those tools, but few have actually been taught how to use them well." – 2-year college, English
College Expectations	Awareness of and preparation for the independence, rigor, and workload of college-level study	27	"Know when the computer or phone is a distraction, and know when to put it away. Know that asking for help is expected in college." – 4-year college, humanities "Students are being 'nurtured' more and more by their schools. Many don't have homework anymore; they are not raised to be self-sufficient. Many expect to be delivered everything by the college." – 4-year college, math
Uncategorized	Comments too vague, idiosyncratic, or not clearly fitting the above categories	85	

Postsecondary respondents' comments disproportionately emphasized the need for students to develop "study skills and time management." Indeed, many respondents emphasized the need for students to become more self-reliant and self-regulating as key secondary and postsecondary readiness capacities. Beyond academics, postsecondary respondents also sometimes called out the importance of "civic and social awareness."

Table 26 provides an overview of the closing comments from secondary respondents.

Table 26. **Secondary Respondents: Final Comments (Open-Ended Comments).**

Category	Operational Definition	Freq	Illustrative Comments
Study Skills and Time Management	Skills for independent learning including time management, note-taking, self-regulation, persistence, and help-seeking	502	"Students need to develop skills and strategies for studying, note-taking, time management, organization, self-discipline, and grit." – High school, science "Social skills, organization skills, note-taking, study habits." – Middle school/junior high school, math
Discipline-Specific Knowledge	Specific background knowledge valued in certain fields such as science, visual/media analysis, and history	189	"Digital media literacy and research skills were not really addressed but are vital. Also, I think some attention to disciplinary literacy is important. Students must be able to read and write within different disciplines." – High school, English language arts "In the sciences, application of knowledge is huge. Just knowing the content is not enough; students must be able to apply that knowledge to real-life problems or alternate scenarios. Many students are lacking any analytical thinking skills to do so." – High school, science
Reading and Critical Thinking	Reading comprehension, analysis, and interpretation with emphasis on applying critical thinking to texts	168	"Writing (developing and expanding on evidence they incorporate, using a thesis statement). Reading for accurate comprehension (not personal interpretation)." – High school, English language arts "Communication skills, the ability to think outside the box, critical thinking skills, contextual interpretations, basic content knowledge taught logically and not as facts to be memorized and spat out." – High school, science
College Expectations	Awareness of and preparation for the independence, rigor, and workload of college-level study	154	"The rigor and workload. They feel that the class is easy, so they can skate by and be prepared for college. Also, students should know how current courses in English relate to college, as [far] as expectations. Many are not on grade level and have aspirations of college success." – High school, English language arts "The expectation level that students should understand they will encounter on the college level. While professors are not anticipating the students will know everything, they are anticipating the students will have a positive work ethic." – High school, social studies
Mathematics and Quantitative Skills	Additional math readiness beyond basics including algebra, fractions, decimals, and quantitative reasoning	141	"Simple problem-solving and basic math." – High school, math "More basic skills that aren't assessed on the SAT, like number sense, fractions, and percentages, as well as how to apply mathematical reasoning to non-math contexts." – High school, math
Communication and Interpersonal Skills	Ability to communicate clearly in writing and speech, engage in face-to-face conversations, and collaborate effectively	132	"Interpersonal communication skills. Public speaking experience." – High school, English language arts "Though not assessed on the College Board test, students need to be able to use soft skills like collaboration, interpersonal communication, and the ability to seek out information when needed." – Middle school/junior high school, math

Table 26 (continued)

Category	Operational Definition	Freq	Illustrative Comments
Research and Information Literacy	Ability to locate, evaluate, and use sources effectively including awareness of media bias and misinformation	130	"Students should be able to evaluate credibility of a source online (news media credibility) and should produce coherent, credible research papers." – High school, English language arts "How to research a topic and write a comprehensive paper that includes cited resources. How to present information/findings to a group without 'reading' it." – High school, science
Logic and Problem-Solving	Foundational skills in reasoning, logic, estimation, and problem-solving across domains	101	"Students need to develop transfer skills in which they can logically deduce how to solve an unknown problem with the skills they have been taught." – High school, math "Logical methods of problem-solving, what to do when you don't know how to solve a problem." – High school, math
Technology and Digital Literacy	Proficiency in using technology for learning including computers (not just phones), software, and online navigation	74	"We incorporate technology, using Canvas and other online programs, to help students be ready in college for the type of homework systems they will be using." – High school, math "Digital literacy, checking claims, and investigating sources." – High school, English language arts
Civic and Social Awareness	Understanding of civics, social issues, current events, and responsibilities of citizenship	71	"Oral communication skills. Problem-solving skills in general. Executive functioning skills. Ability to work in groups and navigate complex social interactions." – High school, science "Basic understanding of the functions of government." – High school, social studies
Uncategorized	Comments too vague, idiosyncratic, or not clearly fitting the above categories	258	

Like their postsecondary colleagues, the secondary respondents strongly emphasized the need for students to develop "study skills and time management," with a heavily disproportionate amount of comments coded to this area. "Civic and social awareness" made the list here as well.

5. Summary, Discussion, and Conclusion

This section encapsulates important findings from the study, considers their meaning, and draws conclusions and implications.

Skill/Knowledge Elements

Postsecondary and secondary respondents were asked to evaluate a series of skill/knowledge elements in literacy and/or math closely tied to the specifications of the SAT Suite tests. Postsecondary instructors rated each element in terms of its importance as a college-entry prerequisite for a course they'd identified on a scale of 1 to 4, with "4" being "very important." These data were then averaged, in terms of both the overall sample and by subject area subsamples, to attain mean importance ratings for individual elements and grand mean importance ratings for content domains of conceptually related elements. A mean or grand mean importance rating of 2.5 or higher was interpreted as meaning that the element was "important" as a prerequisite. Secondary respondents were asked to consider the same skill/knowledge elements but, in this case, in terms of whether a given element was formally taught or not in the class they'd identified and, if taught, at what instructional level (honors/advanced, on grade level, review/remediation) it was primarily taught. Various criteria were established for evaluating the resulting percentage-based data. For literacy, elements were considered "emphasized" if the "taught on grade" percentage was 33 or greater and the "not taught" percentage was less than or equal to 15. For the math elements, only the first of those criteria was applied.

POSTSECONDARY RESPONDENTS

Literacy Summary

With one exception, the overall postsecondary ELAL sample and each subject area subsample (English, humanities [other than English], social science, and science) rated all literacy skill/knowledge elements important (i.e., gave them a mean importance rating of 2.5 or higher). The single exception was the element "Analyze Arguments: Use of Stylistic and Persuasive Elements" in the Essay [Argument Analysis] content domain, which, at 2.4, was just barely rated unimportant by the science subsample. Moreover, all five content domains (Information and Ideas, Craft and Structure, Expression of Ideas, Standard English Conventions, and Essay [Argument Analysis]) were rated important (i.e., given a grand mean importance rating of 2.5 or higher) by both the overall postsecondary ELAL sample and by each subsample.

Math Summary

Postsecondary math respondents were somewhat more varied in their ratings, which we summarize here by content domain.

- **Algebra.** With one exception, all seven skill/knowledge elements were rated important by both the overall postsecondary math sample and by the math and science subsamples. The lone exception was "Systems of Linear Equations and Inequalities: Graph," which, at 2.4, was just barely rated as unimportant by the science subsample. The Algebra domain as a whole was rated important by both the overall postsecondary math sample and the math and science subsamples.
- **Advanced Math.** With one exception, all eleven skill/knowledge elements were rated important by the overall postsecondary math sample. The sole exception was "Systems of Linear and Nonlinear Equations: Solve," which, at 2.4, just missed the "important" threshold. All elements were rated important by the math subsample. Six of the eleven elements were also rated important by the science subsample; of the five rated unimportant by this subsample, three—"Polynomials: Factor," "Rational and Radical Equations: Solve," and "Quadratic and Exponential Equations: Represent Contexts"—just missed the "important" threshold with ratings of 2.4. The Advanced Math domain as a whole was rated important by both the overall postsecondary math sample and by the math and science subsamples.
- **Problem-Solving and Data Analysis.** Three of ten skill/knowledge elements—"Percentages, Proportional Relationships, Ratios, Rates, and Units: Solve Problems," "Linear and Exponential Growth: Identify and Distinguish Between," and "Statistical Graphs: Read and Interpret"—were rated important by the overall postsecondary math sample, and the first two of these were also rated important by the math subsample. At the same time, all ten elements were rated important by the science subsample. The Problem-Solving and Data Analysis domain as a whole was rated unimportant by the overall postsecondary math sample and the math subsample but rated important by the science subsample.
- **Geometry and Trigonometry.** Three of six skill/knowledge elements—"Perimeter, Area, and Volume: Solve Problems," "Pythagorean Theorem and Properties of Special Right Triangles: Solve Problems," and "Sine, Cosine, and Tangent Ratios: Solve Problems"—were rated important by the overall postsecondary math sample and by

the math subsample. Only "Perimeter, Area, and Volume" was rated important by the science subsample. The Geometry and Trigonometry domain as a whole was rated important by the overall postsecondary math sample and the math subsample but rated unimportant by the science subsample.

Postsecondary Discussion

The literacy results indicate strong, cross-curricular support for all skill/knowledge elements tested on the SAT Suite assessments, including the SAT Essay.

The math results indicate strong, cross-curricular support for the skill/knowledge elements tested in the Algebra and Advanced Math content domains by the SAT Suite assessments. The results also suggest strong support from postsecondary science educators for the skill/knowledge elements tested in the Problem-Solving and Data Analysis domain. Half the skill/knowledge elements in the Geometry and Trigonometry domain, as well as the domain itself, were rated important by the overall postsecondary sample and by the math subsample, which suggests some support there as well.

The Geometry and Trigonometry content domain was, in fact, the only one of the four in which any skill/knowledge elements failed to be rated important by either the overall postsecondary math sample or the math and science subsamples. The three elements rated as unimportant by all groups were "Angle and Line Theorems: Solve Problems" (highest rating of 2.4, from the overall sample and the math subsample), "Triangle Similarity and Congruence Theorems: Solve Problems" (highest rating of 2.4, from the math subsample), and "Circle Theorems: Solve Problems" (highest rating of 2.3, from the math subsample). These elements are not "low rated" in an absolute sense, and their relatively low ratings may be largely if not wholly attributable to the comparative narrowness of the applicability of these geometry elements in math and science curricula.

As the SAT Suite tests are intended to measure essential college and career readiness requirements in literacy and math, the postsecondary results pertaining to skill/knowledge elements provide strong evidence of the content validity of the assessments. Although the results for math are slightly less robust than those for literacy, we observe strong and broad endorsement of the Algebra and Advanced Math content domains, strong support from science respondents for the Problem-Solving and Data Analysis domain, and some support for the Geometry and Trigonometry domain as a whole from math respondents in particular.

SECONDARY RESPONDENTS

Literacy Summary

We consider the secondary literacy results by content domain.

- **Information and Ideas.** For the overall secondary ELAL sample and the English language arts and humanities (other than English) subsamples, four of the five skill/knowledge elements met both criterion 1 (i.e., had a "taught on grade" percentage of at least 33) and criterion 2 (i.e., had a "not taught" percentage of 15 or below). The exception in each case was "Quantitative Evidence," which met criterion 1 but failed criterion 2. For the social studies subsample, all five elements met both criteria. For the science subsample, only "Quantitative Evidence" failed criterion 1, while only

"Main Ideas, Central Claims, and Themes" and "Textual Evidence" failed criterion 2. Although the failure of "Quantitative Evidence" to meet criterion 1 for the science subsample seems counterintuitive, it's possible that the full, untruncated element's reference to a "claim, hypothesis, or point *presented in a text*" (emphasis added) may explain the outcome.

- **Craft and Structure.** All seven skill/knowledge elements met both criteria for the overall secondary ELAL sample and the English language arts and humanities (other than English) subsamples. Furthermore, all elements save one met both criteria for the social studies subsample, the single exception being "Text Synthesis (Paired Texts)," which failed criterion 1 but met criterion 2. For the science subsample, two elements—"High-Utility Academic Vocabulary Meaning" and "High-Utility Academic Vocabulary Use"—met both criteria, and two other elements—"Text Structure: Overall" and "Text Purpose"—met criterion 1 but failed criterion 2.
- **Expression of Ideas.** One of the two skill/knowledge elements—"Transitions"—met both criteria for the overall secondary ELAL sample, while the other element—"Arrangement of Words, Phrases, and Clauses"—met criterion 1 but failed criterion 2. The same pattern held for the social studies subsample. Both elements met both criteria for the English language arts and humanities (other than English) subsamples; conversely, neither element met either criterion for the science subsample.
- **Standard English Conventions.** For the overall secondary ELAL sample, all ten skill/knowledge elements met criterion 1 but failed criterion 2. For the English language arts subsample, six of the ten elements met both criteria, while four other elements—"Verbs and Verbals Use," "Appropriate Verb Tense/Aspect," "Modifying Elements," and "Plural and Possessive Nouns and Pronouns"—met criterion 1 but failed criterion 2. For the humanities (other than English) subsample, all ten elements met criterion 1, but only two elements—"End-of-Sentence Punctuation" and "Plural and Possessive Nouns and Pronouns"—met criterion 2. Perhaps not surprisingly, only one element—"End-of-Sentence Punctuation"—met criterion 1 for the social studies but not the science subsample, and no element met criterion 2 for either subsample.
- **Essay (Argument Analysis).** For the overall secondary ELAL sample, four of the five skill/knowledge elements met both criteria. The sole exception was "Analyze Arguments: Use of Stylistic and Persuasive Elements," which met criterion 1 but failed criterion 2. All five elements met both criteria for the English language arts subsample. Two elements—"Write Logical Arguments" and "Write Informative/Explanatory Texts"—met both criteria for the humanities (other than English), social studies, and science subsamples; the other three elements failed one or (in the case of science) both criteria.

Math Summary

We now turn to the secondary math results, going content domain by content domain, beginning with those for high school and continuing with those for middle school/junior high school.

High School Summary

- **Algebra.** For the overall high school math sample, five of the seven skill/knowledge elements met the criterion (i.e., had a "taught on grade" percentage of at least 33). The exceptions were "Systems of Linear Equations: Solve" and "Systems of Linear

Equations and Inequalities: Graph." All seven elements met the criterion for the math subsample, while only two elements—"Linear Equations: Interpret Variables, Constants, and Terms" and "Linear Equations: Graph"—met the criterion for the science subsample.

- **Advanced Math.** Six of the eleven skill/knowledge elements met the criterion for the overall high school math sample. For the math subsample, only one element—"Systems of Linear and Nonlinear Equations: Solve"—failed to meet the criterion. For science, none of the elements met the criterion.
- **Problem-Solving and Data Analysis.** Only three of the ten elements—"Percentages, Proportional Relationships, Ratios, Rates, and Units: Solve Problems," "Linear and Exponential Growth: Identify and Distinguish Between," and "Statistical Graphs: Read and Interpret"—met the criterion for the overall high school math sample. "Percentages, Proportional Relationships, Ratios, Rates, and Units" and "Linear and Exponential Growth" also met the criterion for the math and science subsamples; in addition, "Statistical Graphs" and "Scatterplots: Model Statistical Data with a Linear Function" met the criterion for the math subsample, while "Measures of Center: Solve Problems" met the criterion for the science subsample.
- **Geometry and Trigonometry.** Only one of the six skill/knowledge elements—"Perimeter, Area, and Volume: Solve Problems"—met the criterion for the overall high school math sample and the science subsample. No element met the criterion for the math subsample.

Middle School/Junior High School Summary

- **Algebra.** All seven of the skill/knowledge elements met the criterion for both the overall middle school/junior high school math sample and the math subsample. Only two elements—"Linear Equations: Interpret Variables, Constants, and Terms" and "Linear Equations: Graph"—met the criterion for the science subsample.
- **Advanced Math.** Only one of the eleven skill/knowledge elements—"Equations: Isolate Variables"—met the criterion for the overall middle school/junior high school math sample or the math subsample. All eleven elements failed the criterion for the science subsample.
- **Problem-Solving and Data Analysis.** Seven of the ten skill/knowledge elements met the criterion for the overall middle school/junior high school math sample and the math subsample, with the three failing elements being "Linear and Exponential Growth: Identify and Distinguish Between," "Characteristics of Well-Designed Studies: Understand," and "Margin of Error: Interpret." "Linear and Exponential Growth" and "Characteristics of Well-Designed Studies" met the criterion for the science subsample, although neither the overall sample nor either subsample rated "Margin of Error" as emphasized. In total, six of the ten elements met the criterion for the science subsample.
- **Geometry and Trigonometry.** Four of the six skill/knowledge elements met the criterion for the overall middle school/junior high school sample and the math subsample. The two failing elements were "Sine, Cosine, and Tangent Ratios: Solve Problems" and "Circle Theorems: Solve Problems," both of which are advanced concepts. For the science subsample, only one element—"Perimeter, Area, and Volume, Solve Problems"—met the criterion.

Secondary Discussion

In literacy, we observe generally strong secondary coverage of the Information and Ideas, Craft and Structure, Expression of Ideas, and Essay (Argument Analysis) content domains, with all skill/knowledge elements in each of those domains reported emphasized by the overall secondary ELAL sample, one or more of the subject area subsamples, or both.

The Standard English Conventions domain breaks that pattern. As previously observed, none of the ten skill/knowledge elements met both criteria (i.e., were rated emphasized) for the overall high school ELAL sample, with all elements meeting or exceeding criterion 1 but failing criterion 2. Moreover, across the English language arts, humanities (other than English), social studies, and science subsamples, three elements—"Verbs and Verbals Use," "Appropriate Verb Tense/Aspect," and "Modifying Elements"—failed to be emphasized by any subsample, and, more generally, Conventions elements, more so than those from the other four domains, exhibited comparatively higher "not taught" rates across the board.

We posit two potential reasons for this. First, many secondary English language arts curricula tend to deemphasize the formal teaching of conventions elements, instead favoring opportunistic teaching in such forms as mini-lessons and discussion of or notes on students' writing (or speaking/presenting). Thus, it could be that many conventions elements *are* taught in one way or another at the secondary level, just not "formally" as required by the survey directions. Second, while some state academic standards documents encourage a "progressive" or "spiraled" approach to the teaching of language conventions, meaning particular elements are introduced at one (often elementary) grade level but retaught at successively higher levels of sophistication as students' writing matures, many standards documents instead tie the learning of specific conventions to particular (again, typically elementary or early secondary) grade levels. Thus, many secondary teachers, even in English language arts, may reasonably expect that their students will already have attained full knowledge of conventions by no later than the end of middle school/junior high school and potentially earlier, a possibility reflected by the comparatively high "not taught" rates across the domain.

Turning now to math, when we consider the skill/knowledge elements across grades 6–12 and confine our focus to the responses of math teachers only, a generally cohesive picture emerges.

- All **Algebra** elements met the criterion at both institution levels, suggesting the general, broad-based importance of the algebra of linear relationships across the secondary grades.
- All but one **Advanced Math** element met the criterion at the high school level, while all but one element failed the criterion at the middle school/junior high school level. This suggests a general division of instruction in such elements by institutional level—a not-surprising result given that the elements in this content domain are either themselves advanced mathematical concepts or stepping-stones toward mastery of such concepts.
- Between the high school and middle school/junior high school levels, all but two **Problem-Solving and Data Analysis** elements—"Characteristics of Well-Designed Studies: Understand" and "Margin of Error: Interpret"—met the criterion. This

suggests that most elements in this domain do receive formal attention at one or both institutional levels. (Moreover, "Characteristics of Well-Designed Studies" is reported emphasized by middle school/junior high school science respondents.)

- While no **Geometry and Trigonometry** element met the criterion at the high school level, only two elements—"Sine, Cosine, and Tangent Ratios: Solve Problems" and "Circle Theorems: Solve Problems"—failed the criterion at the middle school/junior high school level. The two elements that failed the criterion at both levels are sophisticated concepts that are likely part of only advanced math instruction, making their criterion failure at the middle school/junior high school level unsurprising.

Thus, when we consider math teaching across grades 6–12 specifically by math respondents, we observe generally strong coverage of skill/knowledge elements.

Rank Ordering of Math Content Domains

The survey item asking postsecondary and secondary math respondents to rank order math content domains in terms of their importance to success in the courses they'd identified found widespread agreement about the relative centrality of "algebra of linear relationships," which corresponds with the SAT Suite Math section's Algebra content domain, and the lesser importance of "geometry and trigonometry." While these data aren't a direct endorsement of the design of the SAT Suite's Math section, they do broadly align with the proportions of test questions assigned to the various content domains, with Algebra questions being most numerous (or tied for most) and Geometry and Trigonometry/Geometry questions being least numerous (or tied for least) across the suite's tests.

Postsecondary and Secondary Respondent Comparisons

As a final way to consider the alignment between postsecondary instructors' expectations for incoming students in literacy and math and secondary teachers' instructional emphases, we performed two additional concatenations of the skill/knowledge elements data. First, for both literacy and math, we identified any skill/knowledge elements that were rated important by postsecondary respondents but not rated emphasized by secondary respondents (which we refer to below as "case 1"). Second, and inversely, we identified any skill/knowledge elements that were rated emphasized by secondary respondents but rated unimportant by postsecondary respondents ("case 2"). The extent to which either of the two cases exist is suggestive but obviously not proof of gaps or misalignment between the two institutional levels.

For literacy, we compared the overall postsecondary ELAL sample to the overall secondary ELAL sample. For math, we compared the postsecondary math subsample to the high school and middle school/junior high school math subsamples. We determined that these differing terms of comparison made sense for the given subject areas. As previously noted, literacy skill/knowledge requirements tend to be similar both across grades and institutional levels and more or less widely and uniformly distributed across subject areas; math requirements, on the other hand, tend to be most consistently and thoroughly articulated for classes and courses in that subject area by experts in that field.

LITERACY

Considering case 1, we find that all twenty-nine literacy skill/knowledge elements were rated important by the overall postsecondary ELAL sample, while thirteen elements were rated not emphasized by the overall secondary ELAL sample, all due to a failure only on criterion 2. Ten of these thirteen elements were in the Standard English Conventions content domain, constituting the totality of that domain and presented here in descending order of respondents indicating that the element wasn't formally taught:

- Verbs and Verbals Use (34% "not taught")
- Modifying Elements (31%)
- Appropriate Verb Tense/Aspect (30%)
- Plural and Possessive Nouns and Pronouns (30%)
- Unnecessary Punctuation (28%)
- Possessive Determiners (26%)
- Punctuation for Supplementary Information (26%)
- Subject-Verb Agreement (24%)
- List and Clause Punctuation (23%)
- End-of-Sentence Punctuation (19%)

As we previously observed, one likely explanation for this outcome is the survey's requirement that secondary respondents answer in terms of whether a given element was or wasn't *formally* taught. Read and applied strictly, this criterion would rule out "incidental" teaching of language conventions elements on a student-by-student and/or assignment-by-assignment basis. Given that many literacy pedagogies favor this sort of opportunistic teaching and learning over formal, standalone lessons on conventions, the results here are presumably not indicative of a clear gap or misalignment between institutional levels. As also noted before, many state academic standards documents presume mastery of most if not all conventions-related work by no later than the end of middle school/junior high school, which would also depress the "taught" percentages at the surveyed high school level.

The other three skill/knowledge elements rated important by the overall postsecondary ELAL sample but rated not emphasized by the overall secondary ELAL sample were as follows:

- Analyze Arguments: Use of Stylistic and Persuasive Elements (18% "not taught")
- Arrangement of Words, Phrases, and Clauses (17%)
- Quantitative Evidence (16%)

We note at the outset that these three elements have lower "not taught" percentages than even the most frequently taught Standard English Conventions element discussed above. Moreover, we observed previously that the responses to "Quantitative Evidence" may have been somewhat depressed, particularly among science respondents, because of the survey item's explicit focus on evidence presented in texts.

Considering case 2, there were no literacy skill/knowledge elements that were rated emphasized by the overall secondary ELAL sample but rated unimportant by the overall postsecondary ELAL sample, as the latter rated all elements important.

Considering both cases together, we find generally good alignment between institutional levels.

MATH

Considering case 1, we find that of the thirty-four math skill/knowledge elements, twenty-three were rated important by the postsecondary math subsample. Of these twenty-three, only two failed to meet the "emphasized" criterion from both the high school and the middle school/junior high school math subsamples by having "taught on grade" percentages below 33:

- Sine, Cosine, and Tangent Ratios: Solve Problems (31% high school "taught on grade," 8% middle school/junior high school "taught on grade")
- Systems of Linear and Nonlinear Equations: Solve (31%, 23%)

We wouldn't plausibly expect the trigonometric concept "Sine, Cosine, and Tangent Ratios" nor the second-year algebra concept "Systems of Linear and Nonlinear Equations" to be routinely taught in middle school/junior high school. It's likely here that these two elements failed the criterion—and barely at that—at the high school level mainly because they're concepts typically reserved for more advanced math study.

Considering case 2, we find that eleven math skill/knowledge elements were rated unimportant as entry requirements by the postsecondary math subsample. Of these, eight met the "taught on grade" threshold percentage of 33 or higher (noted in boldface below) for the high school math subsample, the middle school/junior high school math subsample, or both:

- Angle and Line Theorems: Solve Problems (2.4 postsecondary math mean importance rating, 25% high school "taught on grade," **40% middle school/junior high school "taught on grade"**)
- Triangle Similarity and Congruence Theorems: Solve Problems (2.4, 25%, **36%**)
- Statistical Graphs: Read and Interpret (2.3, **33%**, **59%**)
- Scatterplots: Model Statistical Data with a Linear Function (2.1, **33%**, **50%**)
- Measures of Center: Solve Problems (1.9, 26%, **52%**)
- Measures of Spread: Solve Problems (1.8, 24%, **41%**)
- Probability: Solve Problems (1.8, 26%, **46%**)
- Sample Statistics and Population Parameters: Solve Problems (1.7, 19%, **37%**)

Six of these eight skill/knowledge elements met the criterion at the middle school/junior high school only, which might suggest that these elements are appropriately emphasized at that level and less so at the high school level, in accordance with postsecondary expectations. The other two elements—"Statistical Graphs" and "Scatterplots"—each just barely met the criterion at the high school level, at 33 percent.

Considering both cases together, we find generally good alignment across postsecondary math expectations for incoming students and teaching emphases at the secondary level.

Additional Findings

In terms of **typical allocation of instructional time**, postsecondary literacy respondents reported devoting most attention to writing/composition (postsecondary English subsample) or reading (all other subsamples) and the least amount of time to presenting (postsecondary English subsample) or language study (all other subsamples). Both the overall postsecondary math sample and the math and science subsamples reported that direct instruction or lecture took up the greatest proportion of instructional time, while individual self-paced learning took up the least.

In response to a survey item regarding the **typical instructional levels of identified classes**, majorities or near-majorities of secondary respondents in both literacy and math consistently indicated that their classes were being taught primarily on grade level, and, with the exception of middle school/junior high school science respondents, the least frequently selected response was "below grade level."

Whether in general terms or in relation to their students' ability to read an assigned text independently, postsecondary respondents in both literacy and math tended to be less optimistic in their **assessments of students' college readiness** than were their secondary colleagues. At the same time, the coded open-ended comments from secondary respondents often indicated that the surveyed teachers themselves felt students arrived in their classrooms with insufficient foundational skills and knowledge.

Considering the latter two sets of results in tandem, we can reasonably conclude that postsecondary instructors are often dissatisfied with the level of preparation of their incoming students and assign at least some blame to their secondary colleagues, who, in turn, generally attempt to keep their own classes on grade level while bemoaning the ostensibly inadequate preparation of their own students at lower grade levels. Respondents at both institutional levels who offered open-ended comments also frequently called out perceived academic and "soft" skill deficiencies in their students.

Conclusion

This College Board national curriculum survey was designed to collect validity evidence for the SAT Suite in relation to two main questions:

1. To what extent are the literacy and math skills and knowledge measured on the SAT Suite, as defined by the tests' specifications, deemed important for incoming students to have attained in order to be ready to succeed in entry-level, credit-bearing two- and four-year English, mathematics, humanities (other than English), social science, and science courses?
2. To what extent are the skills and knowledge measured on the SAT Suite being taught in middle school/junior high school mathematics and science classes and in high school English language arts, mathematics, humanities (other than English), social studies, and science classes?

With regard to question 1, the study found very strong support for the content validity of the SAT Suite's Reading and Writing and Math sections and the SAT Essay from postsecondary respondents.

- All surveyed **literacy skill/knowledge elements**, which compose the testing points of the SAT Suite Reading and Writing section as well as key dimensions of the SAT Essay task, were rated important by the overall postsecondary ELAL sample and, with one exception, by all subject area subsamples.
- All five examined **literacy content domains**, which span the SAT Suite Reading and Writing section and SAT Essay, were rated important by both the overall postsecondary ELAL sample and by each subject area subsample.
- In math, in which the surveyed **math skill/knowledge elements** similarly correspond to SAT Suite Math section testing points, all seven Algebra elements were rated important by both the overall postsecondary math sample and by the math and science subsamples, with a single exception for one subsample. All but one of the eleven Advanced Math elements were rated important by the overall postsecondary math sample; all eleven were rated important by the postsecondary math subsample, and six of eleven were also rated important by the postsecondary science subsample. Only three of ten Problem-Solving and Data Analysis elements were rated important by the overall postsecondary math sample; however, all ten elements were rated as important by the postsecondary science subsample, though only two were rated important by the postsecondary math subsample. Three of six Geometry and Trigonometry elements were rated important by the overall postsecondary math sample and by the postsecondary math subsample, while only one element was rated important by the postsecondary science subsample.
- In terms of **math content domains**, the Algebra and Advanced Math domains were rated important by both the overall postsecondary math sample and by the math and science subsamples. Problem-Solving and Data Analysis was rated important by the science subsample. Geometry and Trigonometry was rated important by both the overall postsecondary math sample and by the math subsample.

With regard to question 2, the study found strong evidence that the skill/knowledge elements in literacy and math, particularly those deemed important by postsecondary respondents (which constituted all literacy elements and most math elements), were emphasized by secondary respondents.

- In literacy, we observed generally strong secondary (high school) coverage of the Information and Ideas, Craft and Structure, Expression of Ideas, and Essay (Argument Analysis) content domains, with all skill/knowledge elements in each of those domains reported emphasized by the overall secondary ELAL sample, one or more of the subject area subsamples, or both. This wasn't the case, however, for the Standard English Conventions domain, for which all elements were "not taught" at rates higher than the established criterion. We attribute this outcome to two possible causes: First, the requirement that these elements be *formally* taught may have excluded respondents who teach those elements opportunistically and/or on a student-by-student, assignment-by-assignment basis rather than as standalone lessons. Second, many state academic standards documents indicate that most if not all conventions-related capabilities should have been acquired no later than the end of middle school/junior high school.

- In math at the high school level:
  - Five of seven **Algebra** skill/knowledge elements were rated emphasized by the overall math sample, all seven by the math subsample, and two of seven by the science subsample.
  - Six of eleven **Advanced Math** elements were rated emphasized by the overall math sample, ten of eleven by the math subsample, and none by the science subsample.
  - Three of ten **Problem-Solving and Data Analysis** elements were rated emphasized by the overall math sample, four of ten by the math subsample, and three of ten by the science subsample.
  - One of six **Geometry and Trigonometry** elements was rated emphasized by the overall math sample, none by the math subsample, and one by the science subsample.
- In math at the middle school/junior high school level:
  - Seven of seven **Algebra** elements were rated emphasized by the overall math sample and by the math subsample, and two of seven by the science subsample.
  - One of eleven **Advanced Math** elements was rated emphasized by the overall math sample and by the math subsample, and none by the science subsample.
  - Seven of ten **Problem-Solving and Data Analysis** elements were rated emphasized by the overall math sample and by the math subsample, and six of ten by the science subsample.
  - Four of six **Geometry and Trigonometry** elements were rated emphasized by the overall math sample and by the math subsample, and one of six by the science subsample.

Moreover, when we compare postsecondary and secondary responses in terms of (1) skill/knowledge elements rated important by postsecondary respondents but rated not emphasized by secondary respondents and (2) elements rated emphasized by secondary respondents but rated unimportant by postsecondary respondents, we find the following:

- In literacy:
  - (1) All twenty-nine skill/knowledge elements were rated important by the overall postsecondary ELAL sample. Of these, thirteen—ten of which were in the Standard English Conventions content domain—were rated not emphasized by the overall secondary ELAL sample.
  - (2) No elements were rated emphasized by the overall secondary ELAL sample that weren't also rated important by the overall postsecondary ELAL sample.
- In math:
  - (1) Twenty-three of thirty-four math skill/knowledge elements were rated important by the postsecondary math subsample. Of these, twenty-one were also rated emphasized by the high school math subsample, the middle school/junior high school math subsample, or both.

- (2) Of the eleven elements rated unimportant by the postsecondary math subsample, eight were rated emphasized by the high school math subsample, the middle school/junior high school math subsample, or both. Of these eight, six were rated emphasized solely by the middle school/junior high school math subsample, suggesting that these elements are appropriately emphasized (and presumably attained) at that level and deemphasized at the high school level, in accordance with postsecondary entry expectations.

Considered together, these findings broadly and strongly support the selection of skill/knowledge elements to be tested as part of the SAT Suite's Reading and Writing and Math sections and the SAT Essay.

College Board will continue to periodically collect curriculum survey data and use these data to help guide decisions about and potential refinements to the content assessed on the SAT Suite exams. Readers of various sorts may also find these data helpful in evaluating course content and verifying sound articulation between secondary and postsecondary institutional levels. While no single source of data, including this one, should be determinative when making consequential decisions about what to teach to students or what to reasonably expect from incoming students, curriculum survey data such as those presented in this report can help inform productive discussions within fields and across instructional levels.