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Improving Alignment Between Postsecondary and Secondary Education: The Texas College and Career Readiness Initiative

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Symposium Overview

The goal of the symposium is to present findings from five separate investigations undertaken as part of the Texas College and Career Readiness Initiative (TCCRI), a statewide legislatively mandated set of activities designed to increase the number of students attending college and succeeding once they reach college. This symposium highlights the dimension of the TCCRI that is focused on improving alignment between high school and college by defining and operationalizing postsecondary expectations for college readiness. These activities were undertaken to define what constitutes readiness, validate the definition against current practice in entry-level college courses, develop "reference courses" to serve as benchmarks for college expectations, explore the relationship between college readiness in key cross-disciplinary skills and the expectations present in two-year certificate courses, and analyze the degree to which placement tests measure the knowledge and skills defined as college ready. The session will consider findings from these five aspects of the Initiative within a broader policy context in order to illustrate significance both at the level of each study individually and for the Initiative collectively.

Texas has been a leader in the movement to align high-school curriculum and assessments with college readiness expectations, beginning with the initiation of Closing the Gaps, a plan aimed to ensure high school students in Texas were prepared for college and the workforce (THECB, 2009). In May 2006, the Texas Legislature passed House Bill 1, a major piece of legislation that included multiple initiatives related to high school success and college readiness. Its primary goal is to increase the number of Texas high school students who graduate ready to succeed in college and 21st Century careers.

The TCCRI represents a significant advancement in the field of systems alignment for college readiness. No other state has undertaken such a comprehensive approach to identifying, validating, and implementing the knowledge and skills necessary for college

success. The Initiative consists of four phases that address a range of issues and policies designed to improve statewide alignment between secondary and postsecondary systems. Findings from activities undertaken in Phases I-III of the TCCRI are presented in this symposium.

Conceptual Framework for the Symposium

Preparing all students for college and career readiness is a growing national priority as increasing numbers of parents, educators, business leaders, and politicians emphasize the importance of a highly educated workforce and citizenry (Achieve, 2006). Reaching this difficult goal is complicated by a number of factors. These include the separate governance systems for K-12 and postsecondary education (Conley, 2003), the lack of shared information and expectations across educational systems, the limitations of the existing means for determining college eligibility (Conley, 2007), the changes in the demographics of American public school students (National Center for Educational Statistics, 2007), and even the well-intentioned efforts of states to institute exit examinations (Brown & Conley, 2007).

In order to prepare students to succeed in the U.S. economy and society, states have adopted a strategy of aligning educational expectations vertically and holding schools accountable for achieving defined outcomes (Susan H. Fuhrman, 1993; S.H. Fuhrman & Elmore, 2004). For essentially all states, this means alignment of standards and assessments across elementary, middle, and high school. The key missing link is alignment of expectations between secondary and postsecondary education (Conley, 2005). As a concept, alignment is the underlying driver behind a range of state and federal policies heretofore confined to K-12 education and only now being considered seriously in relation to the transition from high school to college.

The symposium capitalizes on the systemic efforts by Texas to align postsecondary and secondary education, using it as a framework to present a series of findings from an interrelated set of activities designed to set the stage for more concrete actions to align

high school and college. The intent is to balance each presentation between an overview of each study and its findings and a discussion of the overall implications for policy and practice. The studies included in this symposium include:

1. Development of the Texas College and Career Readiness Standards (CCRS)
2. Validation of the Texas College and Career Readiness Standards Against Current practice in Entry-Level College Courses
3. Creation of "reference courses" in each of 20 entry-level college course subject area
4. Analysis of alignment between the CCRS cross-disciplinary standards and the expectations present in entry-level courses leading to two-year certificates at public postsecondary institutions in Texas
5. Analysis of alignment between the CCRS and placement tests commonly used in Texas postsecondary institutions

Scientific or Scholarly Significance of the Studies

The findings from these studies are important for a number of reasons, most important among them is how they illustrate a state's attempt to improve high school-college alignment at the systems level and how such an effort can serve to inform other states. Given current interest in "common core standards," by the US Department of Education and most states, a presentation that highlights postsecondary efforts to set college-ready standards and to align entry-level expectations to such standards will be highly germane. If and when common core standards are adopted by states, the stage will be set for discussions about the alignment of such standards with postsecondary readiness. Having an example of one state's efforts to anticipate the need to align high school and college expectations will be useful and important.

Beyond the general findings from the five presentations, the symposium serves as a sort of proof of concept for the notion of state-based initiatives to align high school and college. The papers offer insights into the process and methodological issues associated with an initiative issue of this sort and also highlight important relationships

between college readiness standards and other aspects of the postsecondary system, such as entry-level courses and placement tests. These insights can help inform policy leaders nationally as they begin to grapple with alignment issues in earnest in the wake of national efforts to focus high school standards on college and career readiness.

Finally, the results shed needed light on the methodological issues associated with alignment work of this nature, which is becoming increasingly widespread and higher stakes. Understanding how to go about establishing the content and expectations of entry-level college courses will be an important area of investigation, and the methodological strategies to do so will be of increasing interest. This symposium will showcase a range of strategies and techniques for working in this area.

Project #1: Development of the Texas College and Career Readiness Standards (CCRS)

Overview

In May 2006, the 79th Texas Legislature (Third Called Session) passed House Bill 1, a major piece of legislation that included multiple initiatives related to high school success and college and career readiness. This legislation added Section 28.008, entitled "Advancement of College Readiness in Curriculum," to Chapter 28 of the Texas Education Code. Its goal was to increase the number of students who graduate from Texas high schools ready to succeed in college and 21st Century careers.

In response to elements of this legislation, the Educational Policy Improvement Center (EPIC) was awarded a contract issued by the Texas Higher Education Coordinating Board (THECB) to facilitate the development and implementation of college and career readiness standards as part of the Texas College and Career Readiness Initiative (TCCRI). The purpose of the TCCRI is to develop and implement college and career readiness standards and activities to improve alignment between secondary and postsecondary education, resulting in an increased number of students prepared for college and career success.

The TCCRI represents a significant advancement in the field of college and career readiness. No other state has undertaken such a comprehensive approach to identifying, validating, and implementing the knowledge and skills necessary for college and career success.

In 2007, EPIC facilitated the development of the College and Career Readiness Standards (CCRS), in partnership with the THECB and the Texas Education Agency (TEA). Vertical teams composed of secondary and postsecondary instructors representing all regions of the state engaged in the development process. These

standards were adopted by the THECB in January 2008, and were sent to the Commissioner of Education and State Board of Education for incorporation into the Texas Essential Knowledge and Skills (TEKS) in April 2008. For details, please see: *Texas College and Career Readiness Standards*, available online at: http://www.thecb.state.tx.us/collegereadiness/TCRS.cfm.

The purpose of this central aspect of the TCCRI was to develop a set of standards that represent what students must know and be able to do to succeed in entry-level college courses in English/language arts, mathematics, science, and social studies. In addition to content specification by subject area, they contain a stand-alone section that specifies cross-disciplinary skills. These skills include many cognitive strategies and techniques necessary for success in a wide range of college courses.

Methodology

The method used to generate the standards was a form of criterion-based expert judgment that combined convergent consensus with theme analysis. Expert teams comprised of 39 carefully selected and vetted secondary and postsecondary faculty members met four times over a period of eight months, reviewed relevant extant standards in their subject area and then completed online exercises between meetings. The postsecondary faculty all taught entry-level courses. The secondary educators all had expertise or experience developing content standards. Drafts were reviewed by national experts and were made available for public comment. Results from the reviews were incorporated into subsequent drafts.

The teams were instructed to use as their reference point the knowledge and skills a student would need to be ready to succeed in a credit-bearing entry-level general education college course at a state postsecondary institution. “Succeed” was defined as being able to complete the entry-level course at a level that would allow further study in the subject area, if the student chose to do so.

Between meetings, EPIC analysts conducted theme analysis on input gathered at each meeting and developed online draft versions that participants reviewed and commented upon between meetings. In this fashion, numerous successive versions came to approximate better the consensus view of the participants.

Results

The final version specified, by subject, the major standards, enduring understandings, key concepts, performance expectations, and performance indicators necessary for college success in each of the subject areas, including English/language arts, mathematics, science, and social studies. In addition, a separate section, the cross-disciplinary standards, detailed the key cognitive skills and foundational skills necessary for college and career readiness that transcend subject matter. The four nested levels are organized as follows:

I. Key Content – Keystone ideas of a discipline that reverberate as themes throughout the curriculum (designated by Roman numerals). Example: *I. Numeric Reasoning*

A. Organizing Component – Knowledge and subject areas that organize a discipline around what students should retain, be able to transfer, and apply to new knowledge and skills (designated by capital letters). Example: *A. Number representation*

1. Performance Expectation – Knowledge and skills that represent important ideas of the current understanding of each organizing concept as well as the multiple contexts in which each organizing concept can be manifest (designated by numbers). Example: *1. Compare real numbers.*

a. Performance Indicator – examples of how to assess and measure performance expectations. This is not intended to be an exhaustive or prescriptive list. The operating premise is that the more of these or other similar indicators a student is successfully able to demonstrate, the greater the probablilty that the student will be prepared to succeed in college (designated by lowercase letters). Example: *a. Classify numbers as natural, whole, integers, rational, irrational, real, imaginary, and/or complex.*

The resulting standards were made available for public review, and Texas postsecondary faculty in particular were encouraged to review and comment upon the draft. Overall, almost 1,000 individuals submitted comments. Table 1 lists the number of participants submitting comments by subject area.

Table 1: Participation in Public Comment Process by Subject Area

Subject	Number of Individuals Submitting Comments
English	271
Math	197
Science	173
Social Studies	165
Cross-Disciplinary	165
Total	**971**

The comments were then analyzed and reviewed by the VT members as they prepared their final drafts. The final version of the standards was submitted to the Commissioner of Higher Education, who presented them to the THECB for adoption at its January 2008 meeting. The CCRS were approved unanimously (the THECB adopted the first three levels; the fourth level, Performance Indicators, are intended to serve only as examples) and sent to the Commissioner of Education and the State Board of Education for incorporation into the Texas Essential Knowledge and Skills (TEKS).

Significance

The Texas College and Career Readiness Standards are significant for several reasons. The method used to develop the standards moved beyond the traditional professional judgment approach by triangulating current entry-level college and secondary faculty members' knowledge and expertise using an iterative process comprised of in-person and online components, incorporating public comments, and validating the standards against practices in entry-level college courses to confirm they do represent the knowledge and skills necessary for postsecondary success. In addition, the VT members used research and standards developed over the past 20 years in the relevant

subject areas, using them as the foundation for creating the CCRS.

Whereas the CCRS serve as an important advancement in standards development, they do differ fundamentally from traditional state high school graduation standards. Overall, they have two different reference points. High school graduation standards tend to focus on graduation (obtaining a high school diploma) as the terminal reference point. They focus more on content knowledge and are the basis for state testing or accountability requirements. The CCRS do not specify what students must master to graduate from high school; rather, they set out what students need to know in order to have a reasonable probability of success in their introductory college course at two- and four-year institutions. The operating premise is that the more of these standards a student can successfully demonstrate, the higher the probability for student success in entry-level coursework and the avoidance of remedial placements. In addition, the two sets of standards can complement each other: most state standards systems do not continue to twelfth grand currently, ending at tenth or sometimes eleventh grade, making the alignment to college readiness standards a reasonable exit level high school extension.

The CCRS also contain a significant distinguishing feature and an important dimension of college and career readiness: the identification and inclusion of the cross-disciplinary standards. The necessity for including the cross-disciplinary standards emerged as the Vertical Teams began to identify important knowledge and skills that transcended their particular subject areas. For example, the Science and Mathematics Vertical Teams collaborated to ensure that the standards in both areas addressed the mathematical skills necessary to be successful in entry-level college sciences courses. Through these cross-team conversations, the need for the cross-disciplinary standards became apparent. These standards represent elements of learning that cut across disciplines, and are organized into two areas: Key Cognitive Skills and Foundational Skills. The Key Cognitive Skills specify intellectual behaviors that are prevalent in entry-level college courses (such as intellectual curiosity, reasoning, problem solving, academic behaviors,

work habits, and academic integrity). Foundational Skills consist of proficiencies students need to be able to transfer knowledge and apply it across the curriculum (such as reading, writing, conducting research, understanding and using data, and using technology). One of the strongest findings from the subsequent validity studies of the CCRS (reported throughout the remainder of the this symposium) is the high level of alignment of the cross-disciplinary standards have with faculty expectations for readiness in entry-level college courses in both general education and Career and Technical Education courses. Through the identification and validation of the high level of importance for success in entry-level college work, the cross-disciplinary skills represent an important body of knowledge all educators are responsible for teaching within their own discipline and context.

The CCRS also represent a unique state-level effort to connect a state's K-12 standards with college and career readiness. The state's willingness to undertake significant legislatively-sponsored statewide alignment activities could serve as a model for other states. These standards serve as the basis for multiple alignment activities. They can be compared to the state high school standards and assessments as a means to determine how well the two are aligned. In addition, districts and high schools can use the standards to align their course expectations more directly with college readiness. This is particularly important for courses beyond the level of or content not covered in the state high school examinations that currently have no explicit reference points. Overall, Texas is an important state in its ability to influence textbook publishers, which could lead to the standards influencing curriculum and textbooks in other states. The CCRS also serve as an important reference point for the higher education system, enabling additional alignment activities such as departmental internal and external course alignment self-examinations, and explorations of placement tests.

Project #2: Validation of the Texas College and Career Readiness Standards (CCRS) Against Current practice in Entry-Level College Courses

Overview

The College and Career Readiness Standards (CCRS) were then validated against current practice by analyzing the content of over 930 syllabi from 20 core entry-level general education courses taught at two- and four-year postsecondary institutions throughout the state. The complete findings from this research are available in the report *Examining the Alignment between the Texas College and Career Readiness Standards and Entry-Level College Courses at Texas Postsecondary Institutions* (Referred to hereafter as the TCCRI Phase II Validity Study) released by EPIC in October 2008.

During Phase I of this project, completed in January 2008, EPIC facilitated the development of the CCRS, in partnership with the THECB and the Texas Education Agency (TEA). Vertical teams composed of secondary and postsecondary instructors representing all regions of the state engaged in the development process. These standards were adopted by the THECB in January 2008, and were sent to the Commissioner of Education and State Board of Education for incorporation into the Texas Essential Knowledge and Skills (TEKS) in April 2008.

The next step in the process was to conduct an alignment analysis to compare the standards to what is actually being taught in entry-level college courses in postsecondary institutions throughout Texas. The purpose was to establish the validity of the standards as an accurate representation of the key knowledge and skills necessary for college and career readiness and success. The results of the study can be used to affirm the accuracy of elements of the CCRS and to identify areas where additions, deletions, or modifications to the standards should be considered.

Methodology

This study was designed to answer the following question: How do the CCRS compare to what is currently taught in entry-level college courses at Texas institutions of higher education? This question was addressed through a validity analysis identifying the alignment and any gaps between the CCRS and current instructional content and practices in 20 entry-level college courses. Over 800 entry-level college course instructors in eight subject areas representing 20 separate course titles rated the importance of what they taught in those courses in relation to the CCRS. They also submitted their course syllabi. External reviewers analyzed the match between the instructor ratings of importance and the content of their syllabi to gauge the accuracy of the self-ratings.

To start this review process, the Commissioner of Higher Education asked the Chief Academic Officers of all state and private colleges and universities in Texas (with the exception of 12 health-related and private career schools) to designate a College Readiness Special Advisor (CRSA) at their respective campuses. The THECB invited 138 public and private institutions of higher education to designate a college readiness special advisor; 108 institutions accepted the invitation. Two public and 28 private institutions did not respond to the invitation.

The THECB charged the CRSAs with soliciting course nominations from their respective institutions. To select the 20 course titles for which data would be collected, the THECB identified courses with high enrollment statewide among entry-level students along with "gatekeeper" courses that are prerequisite requirements for different majors. The THECB selected courses according to the Texas Common Course Numbering System, a uniform set of course designations that the majority of Texas institutions of higher education employ to help facilitate the transfer of entry-level courses between institutions. The course titles selected include the following:

- BIOL 1406 - Biology for Science Majors I

- BIOL 1408 - Biology for Non-Majors I (lecture & lab)
- BIOL 2401 - Anatomy and Physiology I
- CHEM 1405 - Introductory Chemistry I
- CHEM 1412 - General Chemistry II (lecture & lab)
- ENGL 1301 - Composition I
- ENGL 1302 - Composition II
- ENGL 2332 - World Literature I
- GOVT 2301 - American Government I
- GOVT 2302 - American Government II
- GOVT 2305 - Federal Government
- GOVT 2306 - Texas Government
- HIST 1301 - U. S. History I
- HIST 1302 - U. S. History II
- MATH 1314 - College Algebra
- MATH 1324 - Mathematics for Business & Social Sciences I
- MATH 1342 - Elementary Statistical Methods
- PHYS 1401 - College Physics I
- PHYS 1405 - Elementary Physics I
- PSYC 2301 - General Psychology

Between October 2007 and January 2008, Course nominations were collected from CRSAs via a web-based application designed for this specific purpose. Nominations included courses that were considered exemplary, were aligned with the CCRS, or that stood out in some other way as the best representation of an entry-level course in the course title area. The special advisors nominated 1,211 courses by submitting the faculty member's name and contact information and the institution-specific course title when appropriate. The distribution of nominated courses reflected relatively closely the distribution of the state public two-year and four-year institutions by geographic area.

In March 2008, instructors whose courses had been nominated received an email notifying them of the availability of the course submission site. Submitting faculty members provided information on course objectives, class size, grading policy, texts used, prerequisite and pathways courses, and percent of students who enter their course well prepared. Instructors were then instructed to upload an electronic version of the course syllabus. Table 2 reports the distribution of all course submissions

(completed and partial) by region and institution type. In total, EPIC collected 960 course submissions, including 913 complete submissions and 47 partial.

Table 2: Distribution of all Course Submissions by Region and Institution Type

Region	Community College	4 Year Public University	Technical College	Private College	Total
Central	58	33	3	1	95
Gulf Coast	93	63	0	0	156
High Plains	35	21	0	0	56
Metroplex	126	54	0	0	180
Northwest	44	16	3	0	63
South	87	69	14	1	171
Southeast	11	29	31	0	71
Upper East	58	16	4	6	84
Upper Rio Grande	17	10	0	0	27
West	30	27	0	0	57
Total	**559 (58%)**	**338 (35%)**	**55 (6%)**	**8 (1%)**	**960**

After providing course information and submitting a syllabus, instructors completed an online rating form that asked them to answer the following question for each relevant content area standard and cross-disciplinary standard: "How necessary is this element in preparing students to succeed in my course?" Respondents chose one of five options: *Most necessary, More necessary, Less necessary, Least necessary*, or *Not necessary*. Instructors also had the option of skipping any section of the standards if that section was not relevant to their course (e.g., biology instructors could skip the physics section). After selecting a response option for each standard, instructors then chose one or more rationale statements to explain their reasoning. (See Appendix B for a list of scale items and rationale statements.) The rationale statements were designed to provide greater clarity to understand the ratings. For example, an instructor might designate a standard as *Not necessary* or *Least necessary* for one of several reasons. The standard could not be necessary to succeed in the course because it was irrelevant to the subject area, or because it would be covered in a subsequent course. Distinctions of this nature are important when considering discrepant standards. Including the

rationale statements were particularly valuable in interpreting the reasons why specific standards were not well aligned.

External Review to Check the Reliability of Self-Ratings

A common criticism of self-ratings is the potential lack of reliability of such ratings. Self-ratings have the advantage of generating a tremendous amount of information in an efficient and cost-effective manner. However, such ratings should be verified so that findings based on the ratings can be interpreted with confidence as being representative of the actual state of the phenomenon being investigated, in this case the importance of each CCRS in preparing students for success in entry-level college courses.

The method selected to examine the accuracy of the self-ratings was a concurrent expert review. This method uses trained subject-matter experts to use course syllabi from each submitted course to verify the assertions made by the instructor of that course on each CCRS. In other words, if an instructor stated that a particular CCRS was *Most important* for success in a course, the external reviewer would examine the course syllabus to determine whether it contained evidence to support the instructor's self-ratings of alignment with the CCRS. The expert reviewer could choose among three statements: *Evident*, *Not evident*, or *Not applicable.* By selecting *Evident*, the expert reviewer indicated that the standard was *Reasonable to infer*, *Stated verbatim*, or *Implied* in the course documents.

Expert reviewers examined a sample consisting of approximately 20 percent of courses submitted in each course title area. Table 2 presents the percent of instructor responses confirmed by external reviewers by course title. The rate of confirmation ranges from 96 percent in BIOL 2401 (Anatomy and Physiology I) to 50 percent in CHEM 1405 (Introductory Chemistry I).

Table 2: Percent of Instructor Responses Confirmed by Course Title

Course Title	# of Courses Reviewed	% of Instructor Responses Confirmed
BIOL 1406 - Biology for Science Majors I	11	89%
BIOL 1408 - Biology for Non-Majors I (lecture & lab)	6	86%
BIOL 2401 - Anatomy and Physiology I	9	96%
CHEM 1405 - Intro Chemistry I	9	50%
CHEM 1412 - General Chemistry II (lecture & lab)	8	60%
ENGL 1301 - Composition I	13	90%
ENGL 1302 - Composition II	12	94%
ENGL 2332 - World Literature I	11	92%
GOVT 2301* - American Government I	8	89%
GOVT 2302* - American Government II	6	83%
GOVT 2305* - Federal Government	4	77%
GOVT 2306* - Texas Government	4	91%
HIST 1301 - U. S. History I	11	85%
HIST 1302 - U. S. History II	11	79%
MATH 1314 - College Algebra	15	88%
MATH 1324 - Mathematics for Business & Social Sciences I	12	92%
MATH 1342 - Elementary Statistical Methods	11	87%
PHYS 1401 - College Physics I	9	63%
PHYS 1405 - Elementary Physics I	4	68%
PSYC 2301 - General Psychology	10	53%

Results indicate acceptable to very high matches between instructor self-ratings of courses against the CCRS and the expert reviewer confirmation of the ratings. Only five courses fell below the 75 percent level of verification. Given the inherent difficulties of determining instructor intent from a syllabus and the complexity and number of the College and Career Readiness Standards, the levels at which external reviewers found evidence of the CCRS within the syllabi chosen for review is sufficiently high to have confidence that the instructor self-ratings can be taken as accurate representations of course content.

Determining Alignment Thresholds

Once all data from instructors were received and analyzed, it was possible to establish the criterion point for determining that alignment existed or did not exist between the

CCRS and the course content. In essence, this was a standard setting activity in its own right. For each individual CCRS statement, the modal instructor response was determined. Each standard could have a score of 1 through 5, representing each of the response options. The modes for each CCRS statement were examined via a scatter plot in order to identify overall patterns. In some cases, a CCRS statement had multiple modes. This analysis confirmed the appropriateness of collapsing the categories of *Most necessary* and *More necessary*, using this new category to identify alignment between the CCRS statement and instructor self-rating of CCRS importance. CCRS statements for which the modal score was *Less necessary* were labeled as inconsistently aligned, and CCRS statements that had a modal score of *Least necessary* or *Not necessary* were identified as being not aligned.

Results

Ultimately, over 800 instructors representing 87 IHE and four college districts submitted over 900 syllabi and ratings from 20 different entry-level, credit-bearing courses. Results from the analysis revealed that the CCRS are highly aligned with entry-level college courses in Texas. Rates of alignment by subject area for all standards were 99 percent in social studies, 97 percent in English/language arts, 87 percent in mathematics, and 86 percent in science. For the cross-disciplinary standards, 100 percent are aligned across the four subject areas (90 percent are aligned within each of the four subject areas individually). Whereas all of the CCRS may not be aligned in any single course, an examination across all courses within a given subject area reveals the high degree of alignment between the CCRS and all entry-level courses in that subject. Table 3 below lists the results by subject area, and also includes the overall levels of alignment for the cross-disciplinary skills both aggregated and by subject area.

Table 3: Summary of Overall Alignment by Subject Area and Cross-disciplinary Skills

Subject	Aligned	Inconsistently Aligned	Not Aligned	Multimodal
All English	97%	2%	1%	0%
All Math	87%	8%	5%	0%
All Science	86%	14%	0%	
All Social Studies	99%	1%	0%	0%
Cross-Disciplinary All Subjects	100%	0%	0%	0%
Cross-Disciplinary All English	98%	0%	2%	0%
Cross-Disciplinary All Math	91%	9%	0%	0%
Cross-Disciplinary All Science	100%	0%	0%	0%
Cross-Disciplinary All Social Studies	98%	2%	0%	0%

Note: for a detailed exploration of the alignment results at the individual standard level within each subject area and course, please refer to the original TCCRI Phase II Validity Study.

Two notable exceptions to the overall high level of alignment emerged in this study. First, three key content areas were found to be not well aligned: Geometric Reasoning in mathematics; and Earth and Space Sciences and Environmental Science in science. The reason for the lower levels of alignment in these three areas is due to the fact none of the entry-level courses selected for inclusion in the data collection for this study typically cover that content, and an additional study would be necessary to analyze the relationship between those standards and the appropriate entry-level courses not included in this study. Therefore, the overall rates of alignment for all standards in mathematics and science alignment understate the actual degree of alignment by including standards in these three areas not included in the data collection. The adjusted rates of alignment for the standards represented in the data collection are 93 percent for mathematics and 92 percent for science.

Secondly, there was a notably low level of alignment between the physics CCRS and

current practice in entry-level physics courses. Only 56 percent of the 50 physics standards were rated most necessary or more necessary for preparation for success in entry-level physics courses, compared to 91 percent in biology and 94 percent in chemistry. Further analysis of the rationale statements provided by the physics instructors found the primary reason that the physics standards were not rated as aligned was because the faculty taught those standards as new material at the college level. When presented with these findings, the original CCRS Science Vertical Team recommended the physics standards to remain unchanged due to the nature of the discrepancy. Having the opportunity to learn the physics standards in the secondary setting would only help better prepare students for what the postsecondary faculty will be teaching in their entry-level physics courses.

Significance

This study is important because it is the first large-scale validity study of college readiness standards undertaken at a state level. Previous college readiness standards were developed by expert judgment panels and were often buttressed by exemplar materials. But none of these went so far as to validate the standards against current practice in college classrooms by using instructor review and syllabus analysis to confirm the expert judgment process. This study offers insight into the methods for conducting a validation study of this nature in addition to presenting the empirical findings specific to the CCRS. It is important to have validated college readiness standards particularly in states that are considering aligning high school and college expectations, standards, or assessments. The validated college readiness standards can then be used for planning purposes between state K-12 education departments and postsecondary system offices. Given the high degree of investment that education departments in most states have in the state's high school standards and assessments, it is unlikely most states will make changes in these standards to improve system alignment unless it can be proven that the college readiness standards are a valid representation of current practice in the state's entry-level college courses.

Project #3: Creation of Reference Course Profiles in Entry-Level College Courses

Overview

A separate component of the Phase II Study analyzed the results of the course ratings to identify common practice within current entry-level courses and develop 18 Reference Course Profiles. The Reference Course Profiles are composite courses designed to represent the content and rigor of what is typically being taught currently in entry-level college courses, and provide a snapshot of current practice (not best practice). A profile includes a course syllabus with significant additional detail along with attendant course materials, such as assignments, assessments, and scoring rubrics. The reference courses do not represent best practice; instead, each of the 18 reference courses was intended to represent normative practice at a wide range of postsecondary institutions within Texas. While in practice any individual course at a postsecondary institution might differ from the reference course, enough consistency will exist for the reference course to be a useful target for secondary teachers to use in preparing students for college. A more detailed description of this research can be found in the last section of the report *Examining the Alignment between the Texas College and Career Readiness Standards and Entry-Level College Courses at Texas Postsecondary Institutions* (or the TCCRI Phase II Validity Study) released by EPIC in October 2008.

The purposes of the Reference Courses are two-fold. At the secondary level, instructors can refer to the materials as they prepare their students for the course content they will encounter when they reach college. At the postsecondary level, the materials serve as a point of comparison that faculty can use when creating or refining entry-level courses. Whereas the use of the Reference Course Profiles is purely voluntary, the goal for institutions of higher education is to ensure that entry-level courses are aligned with the CCRS, contain college-level content, and are cognitively challenging. By making

expectations more transparent, the Reference Course Profiles will help students, educators, and policymakers understand more clearly and reach agreement more quickly on the nature of the student preparation necessary for college success.

Methodology

This study was designed to answer the following question: What are the most common components of and current practices in entry-level college courses in Texas representing 18 specific course titles? To answer this question, 18 Reference Course Profiles were created through a linked criterion-based analytic process. In short, this approach linked several steps including identifying the modal courses and designing the profiles. The CCRS and the modal faculty expectations relative to the standards in entry-level courses within a course title were used as the criteria throughout the process. The modal course profile represents the typical instructor response pattern for each course title. Using the modal course profile, 10 individual courses were identified as the most highly aligned with the typical aggregate rating results for each course title. The course materials from these modal courses paint a picture of the most frequent current instructional priorities and practices for the specified courses in Texas institutions of higher education.

The Reference Course Profiles were compiled from data collected from faculty ratings, syllabi, and additional course documents submitted by instructors in entry-level college courses throughout Texas during the data collection process described in the Phase II Study in the previous section. Table 4 shows the distribution of submitted syllabi by institution type. This table reports only usable submitted syllabi, and does not reflect the number of instructor rating completions or partial submissions.

Table 4: Distribution of Submitted Syllabi by Institution Type

Course	Syllabi Submitted: 2-year	Syllabi Submitted: 4-year	Syllabi Submitted: Total
BIOL 1406	26	33	59
BIOL 1408	16	17	33

Course	Syllabi Submitted: 2-year	Syllabi Submitted: 4-year	Syllabi Submitted: Total
BIOL 2401	24	21	45
CHEM 1405	19	30	49
CHEM 1412	21	23	44
ENGL 1301	30	37	67
ENGL 1302	27	34	61
ENGL 2332	24	32	56
GOVT 2301	10	21	31
GOVT 2302	10	17	27
HIST 1301	19	31	50
HIST 1302	21	32	53
MATH 1314	28	40	68
MATH 1324	29	30	59
MATH 1342	21	32	53
PHYS 1401	21	27	48
PHYS 1405	11	11	22
PSYCH 2301	24	30	54
Total	**381**	**498**	**879**

Creation of the Modal Courses

The first step in the linked criterion-based analytic process was to identify the subset of courses most aligned with current practice in entry-level college courses in Texas. The data analyzed consisted of a scale item response for each standards statement. Scale item responses were represented by the numbers one through six and corresponded with *Not necessary, Least necessary, Less necessary, More necessary, Most necessary,* and *Skip section,* respectively. As in the alignment study, responses left blank were treated as missing data and excluded from the analysis.

Then, a "modal course profile" was created that represented the typical response pattern for the set of rated standards for the identified courses in each course title area, 18 in total. The modal course was determined by the aggregation of the results of the instructors' self-ratings representing the necessity of each CCRS for successful preparation for the course. In other words, the modal course profile reflects the CCRS as they are most typically represented in that course title area.

Proximity Measures

Once the modal course profiles were generated, the next linked step was to calculate a measure reflecting the percent agreement between the ratings for each course and the modal course ratings (a percent match measure) along with three proximity measures that examined the similarity between each of the selected courses in a course title area and the modal course in that area. The proximity measures included: 1) a Euclidean distance measure, 2) a measure of the correlation of the response pattern for each course and the modal course, and 3) the cosine value of the angle between the response pattern for each course and the response pattern for the modal course. These three proximity measures, though distinct, resulted in course orderings that were highly related to one another.

Next, a factor analysis considered all proximity measures as well as the percent match value to compute a final score for each course using a linear combination of the four similarity measures. These factor scores were used to rank-order the courses in order of similarity to the modal course based on the combination of similarity measures. The ten most similar courses for each course title then become the basis for building Reference Course Profiles that integrate the practices found across these courses, paying special attention to the most similar courses.

The ranking of these factor scores were used to rank-order a total of 180 courses across the 18 course title areas, i.e., the ten courses most aligned to the modal course for each of the 18 Reference Course Profiles titles. The distribution of these 180 courses is similar to the distribution of all courses submitted, although community and technical colleges are slightly overrepresented, and four-year universities and private colleges are slightly underrepresented. Private colleges are absent from the list of most representative courses.

Additional materials, such as assignments and assessments, were collected from instructors of these identified courses early in Phase III, beginning Fall 2008. Design

teams created the Reference Course Profiles through a criterion-based professional judgment process in which decisions about what to include in the profile are made based on alignment with the CCRS and the content of the ten highly aligned courses per course title area.

These additional course artifacts provided deeper insight into the ways in which instructor expectations relate to the CCRS. Design teams were formed for each content area, and each team was composed of three postsecondary instructors. These design teams synthesized the results from the linked criterion-based analytic process to create the Reference Course Profiles. The resulting Reference Course Profiles will then serve to demonstrate how and why the relevant CCRS for that course title area are important to success in the course.

Results

Design teams created the 18 Reference Course Profiles through a criterion-based professional judgment process. Decisions about what to include in the Reference Course Profile were made based on alignment with the CCRS and the course materials from the ten modal (highly aligned) courses per course title area. The additional course artifacts provided deeper insight into the ways in which instructor expectations relate to the CCRS. Design teams were formed for each content area, and each team was composed of three postsecondary instructors. These design teams synthesized the results from the linked criterion-based analytic process to create the Reference Course Profiles. The resulting Reference Course Profiles not only provide a snapshot of current practice, but also demonstrate how and why the relevant CCRS for that course title area are important to success in the course.

Reference Course Profile Template

This next section outlines the template that was used by each of the design teams to develop the Reference Course Profiles. The template includes all of the section headings of the profile, and short descriptions. For a complete Reference Course Profile example, please refer to "Appendix C: Reference Course Profile: English Composition II."

Course Name
Course Number
Course description appearing in the Lower Division Academic Course Guide Manual.

Reference Course Profile: Overview and Purpose

A Reference Course Profile represents **current** practice in entry-level college courses in Texas. Twenty-six course profiles were developed from an extensive study of over 900 entry-level general education and CTE college courses offered at Texas institutions of higher education. Each course profile consists of a course description, sample syllabus, reference lists, attendant course materials (such as assignments, assessments, and, in some cases, scoring rubrics), and the Texas College and Career Readiness Standards addressed within the course.

The Profiles provide a reference point for college readiness that fosters increased transparency between secondary and postsecondary education. **They are not intended to be mandatory, prescriptive, or best practice.**

Prerequisites and Prior Knowledge

Most college-level syllabi do not list all prior knowledge required to succeed in the course; it is usually an underlying assumption. For the purpose of this Reference Course Profile, the required prior knowledge and skills students need to be successful in the course are explicitly stated to help both secondary and postsecondary faculty establish goals and expectations for their students. The knowledge and skills reflected in this section are pulled directly from the Texas College and Career Readiness Standards (CCRS), written and validated by Texas faculty during the 2007-8 school year. The CCRS are available online at: http://www.thecb.state.tx.us/collegereadiness/CRS.pdf

Prior to enrolling in this course, students must satisfy Texas Success Initiative (TSI) requirements set by the institution as described in Coordinating Board rule (Texas Administrative Code, Chapter 4, Subchapter C).

An instructor might also require a pre-semester diagnostic test to help the student assess his or her current ability in _____.

In addition, students should have the skills reflected in the following College and Career Readiness Standards. Only the specific standards and performance expectations pertinent to the course are listed below.

College and Career Readiness Standards

I.
   A.
      1.
      2.

Cross-Disciplinary Standards

I. Key Cognitive Skills
II. Foundational Skills

Course Objectives

Course objectives include the course-specific skills and knowledge that students will possess upon completion of the course. They assist postsecondary faculty in clarifying the goals of their courses and provide a clear picture of the expectations students will encounter once they begin college. This sample list of objectives was adapted from syllabi submitted in 2008 by Texas college faculty.

In this course, [course title], students will learn_____.
Upon completion of the course the student will be able to:

1.
2.

Sample Textbooks and Materials

This list is comprised of texts that appear on course syllabi submitted in 2008 by faculty teaching entry-level college courses most representative of current practice in Texas. This list is not exhaustive, prescriptive, or required.

Sample Methods of Instruction

Students should be prepared to encounter a variety of instructional methods, as faculty indicate the use of several beyond the lecture format. The list of methods of instruction has been adapted from course syllabi submitted in 2008 by faculty teaching entry-level college courses most representative of current practice in Texas. The approximate percentage of time allocated to each instructional method is also indicated.

1. Lecture – X%
   a. Lecture is defined as _____.
   b. Lectures will take place in the form of _____.
2. Full-class Discussion – X%
   a. Students will be expected to come to class ready to contribute to class discussion.
   b. Students will be expected to listen and respond to each other's comments.
3. Method of Instruction – X%

Sample Assignments

A typical number of formal assignments for [course title] is _____. The course will also include a number of other types of assignments including _____. Below are the kinds of assignments that might be expected and the percentage of the final grade each might carry.

1. Written Work – X%
   a. Statement re: appropriate format.
   b. Statement re: appropriate citation style.
   c. Statement re: appropriate writing style.
   d. Statement re: length requirement:
2. Other assignment type – X%
   a. Statement of information necessary to inform student expectations.
3. Other assignment type – X%
   a. Statement of information necessary to inform student expectations.

Sample Assessments

Typically [course title] will include _____ formal examinations. Typically the culminating assessment for the course will be _____.

Specific Assessments:

1. Quizzes – X%
   a. Statement of information necessary to inform student expectations.
2. Final Exam – X%
   a. Statement of information necessary to inform student expectations.

Sample Schedule

Samplings of assignments and assessments have been provided in the Reference Course Profile materials. Bolded blue text indicates when a document is provided and a link to that document is available. The time allocated for students to complete the assignment is also indicated. The list of topics, as well as the overall pacing of the course, has been adapted from course syllabi submitted in 2008 by faculty teaching entry-level college courses most representative of current practice in Texas.

Week	Reading/Discussion Topics	Assignments & Assessments
1		***Assignment 1:***
2		Complete _____ exercise. Take _____ quiz.
3		***Assignment 2:***
4		Take _____ quizzes.
5		***Assignment 3:*** Complete _____ exercise. Take _____ quiz.
6		Take _____ quizzes.
7		***Assignment 4:*** Take _____ quizzes.
8		***Exam 1 – Midterm Assessment***
9		***Assignment 5:***
10		Take _____ quiz.
11		***Assignment 6:***
12		Complete _____ exercise. Take _____ quiz.
13		***Assignment 7:*** Class presentations
14		***Assignment 8:*** Final conferences
15	***Exam 2 – Final Exam***	

Sample Class Policies and Expectations

Students often enter college unaware of expectations regarding attendance, participation, behavior, grading, and academic integrity. Faculty frequently include detailed policies and expectations in their syllabi, making explicit to students the standards of successful participation. Institutional-level policies are often included as well.

Attendance Policy

Students are expected to attend class regularly and to complete assignments on the days specified.

Expectations

Student Conduct

- No _____ permitted in the classroom.
- Disruptive behavior will not be tolerated.
- Examples of disruptive behavior include _____.

Academic Behaviors

Students are expected to _____.

Grading Policy

Overview of Grades and Grading Standards

- A (90–100) = excellent/performance beyond mastery
- B (80–89) = above average/beyond basic mastery
- C (70–79) = average mastery
- D (60–69) = below average
- F (0–59) = failure

Percentages of Grade

- Assignment Type – X%
- Assessment Type – X%
- Quizzes – X%

Academic Integrity Policy

Sample List of Student Resources

The following list is representative of the resources mentioned in 2008 entry-level college course syllabi in Texas. The resources listed are indicative of the expectation that postsecondary students take responsibility for their own learning. As often explicitly stated in course syllabi, students are expected to take advantage of these resources, and may even be required to do so.

Supplementary Documents

The section lists the additional documents included within the Reference Course Profile, but not included in the Sample Schedule. These supplementary materials are intended to enhance both instruction and student learning, and may be used at instructors' discretion.

Significance

The current phase of the Texas College and Career Readiness Initiative uses the Reference Course Profiles as a primary reference point in the creation of College Readiness Assignments that are being designed to assess college readiness. College Readiness Assignments, scoring guides, and work samples that align with the Reference Course Profiles will be disseminated statewide as part of a professional development effort to assist educators in improving student preparation for credit-bearing entry-level college coursework and improving transparency across the secondary and postsecondary systems.

The Reference Course Profiles are important tools for systems alignment because they create an operational connection between the CCRS and actual practices in college courses. They help move the alignment discussion beyond anecdote and assertion regarding the nature of postsecondary expectations by offering concrete, specific descriptions of college courses against which high school programs of study can be aligned. For the first time, a state has sponsored a system wide analysis of entry-level college courses, thereby providing a research-based point of reference.

An additional use of the profiles is as a resource for improvements to postsecondary education. One of the results of the decentralization of postsecondary governance and instruction is that it is essentially impossible to compare practices across a set of courses with the same title offered at different institutions, or even at the same institution. The Reference Course Profile is a potential tool for comparing the expectations, content coverage, and challenge level present in any individual course to a more independent standard. While the profile is not designed to standardize instruction across institutions, nor represent best practice, it is a useful resource for

helping to enhance consistency across entry-level courses, which can foster improved alignment between secondary and postsecondary education, if secondary educators have consistent targets toward which to align their courses and instruction.

Project #4: Alignment Between the CCRS and Expectations in Entry-Level Career and Technical Education Courses

Overview

In Fall 2008, EPIC was awarded an additional contract issued by the THECB to explore the relationship between the cross-disciplinary standards and Career and Technical Education (CTE) courses. Under this contract, EPIC replicated the validation methodology of the TCCRI Phase II Validity Study, by comparing the CCRS cross-disciplinary standards to nine CTE courses at two-year institutions throughout the state. This report summarizes the results from the study. The complete findings from this research are available in the report *Texas College and Career Readiness Initiative: Texas Career and Technical Education Phase I Alignment Analysis Report* (referred to hereafter as the Phase I CTE Study) released by EPIC in March, 2009.

The purpose of this study was to examine the relationship between the Texas College and Career Readiness Standards (CCRS) and what is currently being taught in nine entry-level Career and Technical Education (CTE) courses throughout Texas. The findings from this research will enable high school faculty to determine the degree to which what they are teaching is aligned with the knowledge and skills necessary for success in a community college or technical college environment. Furthermore, both high school and postsecondary faculty teaching CTE courses will have a concrete benchmark against which they can compare the challenge levels of their courses.

A unique feature of the CCRS is the inclusion of cross-disciplinary skills that span all subject areas. These are the foundational cognitive skills that underlie and connect all disciplinary areas and that students need to be able to apply across a variety of contexts and subject matter. They relate to 21st Century learning and work environments in which the cross-disciplinary skills are prerequisites to solving many of the most important problems students will encounter in college and the workplace. The cross-

disciplinary standards are divided into two areas: Key Cognitive Skills, such as reasoning, problem solving and conducting research; and Foundational Skills to process and create content knowledge, such as reading, writing, and data analysis.

The Phase I CTE Study consists of two phases designed to identify the relationship between CTE courses and the cross-disciplinary CCRS, and then to illustrate those relationships in more concrete fashion. The two phases are outlined below:

Phase I: Alignment Analysis

Nine entry-level CTE courses were analyzed against the CCRS cross-disciplinary standards, which are arranged in four nested levels. The THECB adopted the first three levels; the fourth level includes Performance Indicators intended to serve only as examples. This study analyzed the first three levels, which represent the Key Cognitive and Foundational Skills and knowledge necessary for college and career preparation. The cross-disciplinary skills are organized as follows:

I. Key Cognitive Skills – overarching skills that are necessary for success across the curriculum. Example: *I. Key Cognitive Skills*

A. Organizing Component – cognitive skills for which a range of specific strategies can be developed and mastered. Example: *A. Intellectual Curiosity*

1. Performance Expectation – specific strategies that make up the cognitive skill. Example: *1. Engage in scholarly inquiry and dialogue.*

a. Performance Indicator – examples of how to assess and measure performance expectations. This is not intended to be an exhaustive list. Example: *a. Identify what is known, not known, and what one wants to know in a problem.*

Phase II: Reference Course Profile Development

Based on the course data collected and analyzed in Phase I, design teams made up of postsecondary CTE content experts developed composite Reference Course Profiles to represent the content and rigor of courses in which entering college students should be prepared to succeed.

Methodology

This Phase I study was designed to answer the following question:

> *How do the standards contained in the cross-disciplinary skills section of the Texas College and Career Readiness Standards compare to what is currently taught in a range of entry-level Career and Technical Education course areas at Texas institutions of higher education?*

This question was addressed by replicating the research design from the TCCRI Phase II Validity Study analyzing the relationship between the CCRS and entry-level general education courses. The validation methodology included: working with institutional liaisons to nominate CTE instructors to participate in the study, developing an online document collection and self-ratings tool, collecting course documents (including syllabi, assignments, assessments, and scoring rubrics) and self-ratings of the level of necessity of each cross-disciplinary standard for preparation for the course, providing quality control and technical assistance, and using the results to analyze and report on the level of alignment between the cross-disciplinary standards and the CTE courses.

The key differences between the TCCRI Phase II Validity Study and this study are twofold. First, the TCCRI Phase II Validity Study examined entry-level general education courses in English/Language Arts (ELA), mathematics, science, and social studies around which the content standards of the CCRS were organized. This study examines a representative range of CTE courses comprising subject matter that varies significantly from the content standards of the CCRS.

Second, the TCCRI Phase II Validity Study examined the relationship between specific subject area standards and the related entry-level courses (for example, the ELA standards were analyzed against entry-level composition and literature courses). That

report also compared all courses in the core subject areas to the cross-disciplinary standards. The CTE study compared representative courses only to the cross-disciplinary standards. The content standards included in the CCRS were designed to represent the knowledge and skills necessary for success in the related entry-level courses, not the universe of entry-level courses. The cross-disciplinary skills, on the other hand, were those standards that were found to transcend subject matter, and are therefore, can be used as a framework for examining all CTE courses.

Data Collection and Analysis Methods

Between November 2008 and January 2009, 136 entry-level CTE course instructors at 43 different postsecondary institutions throughout Texas representing 157 courses in seven subject areas and nine separate courses rated the importance of each cross-disciplinary standard in relation to their course(s). Instructors teaching entry-level CTE college courses submitted data through a web-based application.

The data collection process began with the College Readiness Special Advisors at 51 two-year public postsecondary institutions soliciting course nominations from their respective institutions. The THECB identified course titles that enrolled significant numbers of students statewide among entry-level CTE students. The THECB selected courses according to the Texas Common Course Numbering System, a uniform set of course designations that the majority of Texas institutions of higher education employ to help facilitate the transfer of entry-level courses between institutions. The course titles selected consist of the following:

- ACNT 1303 Introduction to Accounting I
- BMGT 1303 Principles of Management [1]

[1] *Includes courses with course title MGNT 1303 Principles of Management*

- DFTG 1309 Basic CAD
- DFTG 1405 Technical Drafting
- ITSC 1301 Introduction to Computers
- ITSC 1401 Introduction to Computers
- MRKG 1311 Principles of Marketing
- POFI 1301 Computer Applications I
- POFT 1301 Business English

Course nominations were collected from the Special Advisors between October 2008 and mid-January 2009. The Special Advisors nominated 211 courses by submitting the faculty member's name and contact information and the institution-specific course title when it was known.

In December 2008, instructors whose courses had been nominated received an email asking them to log in to the online course-submission site. The online course submission process included the following five steps:

1. Consent to Participate: Participating instructors authorized the use of their submitted course materials in the creation of a composite Reference Course Profile. In addition, instructors granted the THECB permission to publish, in part or in whole, any of the documents that were subsequently incorporated into a Reference Course Profile. (See Appendix A to view a copy of the consent form.)

2. Course Profile: Participating instructors provided general course information including course objectives, class size, grading policy, texts used, prerequisite and pathways courses, and percentage of students who enter their course well prepared.

3. Course Ratings: Instructors were asked to rate the first three levels of the cross-disciplinary standards. The three top levels were included so as to be able to analyze the level of necessity of the cross-disciplinary knowledge and skills. For example, was an entire organizing component (the second level) not necessary for a CTE course, or just individual performance expectations within the organizing component? The fourth level of the CCRS, the performance indicators, are not standards per se, but examples of how the standards could be demonstrated and measured. As the intent of the performance indicators was for example purposes only, they were not included in the ratings analysis. Participating instructors completed an online rating form that asked them to answer the following question for each cross-disciplinary standard: "How necessary is this element in preparing students to succeed in my course?"

Respondents chose one of five options: *most necessary, more necessary, less necessary, least necessary, or not necessary.* After selecting a response option for each standard, instructors then selected one or more rationale statements to explain the reason they rated the item the way that they did. (See Appendix B for a list of scale items and rationale statements.) The rationale statements were included to provide greater clarity of understanding of responses. For example, an instructor might designate a standard as *not necessary* or *least necessary* for one of several reasons. For example, the standard might not be necessary to succeed in the course because it was irrelevant to the subject area, or it might be covered in a subsequent course. The rationale statements were particularly valuable in interpreting the reasons why specific standards were found to be not well aligned.

4. Additional Questions: Participating instructors also responded to a set of specific questions to collect data on common components of and current practices in entry-level Career and Technical Education courses. (See Appendix C for the list of additional questions.)

5. Upload Course Materials: Participating instructors uploaded key course documents, including syllabi, assignments, assessments, grading rubrics and any other relevant materials. All identifying information was removed.

Overall, instructors at 43 separate public two-year postsecondary institutions throughout the state of Texas completed course submissions. Table 5 presents an overview of the disposition of all nominated courses.

Table 5: Final Course Status for All Nominated Courses

Course Title	Completed Course Nomination	Partial Completed Course Submission	Declined Participation	No Response	Total
ACNT 1303 Introduction to Accounting I	25	0	1	9	35
BMGT 1303 Principles of Management	20	0	0	11	31
DFTG 1309 Basic CAD	20	1	0	3	24
DFTG 1405 Technical Drafting	15	0	0	5	20
ITSC 1301 Introduction to Computers	11	1	0	8	20
ITSC 1401 Introduction to Computers	9	1	0	3	13
MRKG 1311 Principles of Marketing	19	0	2	6	27

Course Title	Completed Course Nomination	Partial Completed Course Submission	Declined Participation	No Response	Total
POFI 1301 Computer Applications I	17	0	0	1	18
POFT 1301 Business English	21	0	0	2	23
Total	**157**	**3**	**3**	**48**	**211**

Courses submitted from an individual institution ranged from 1 to 14. The average number of courses received from participating campuses was 3.7. Table 3 summarizes the distribution of course submissions by institution type and region.

Table 6: Distribution of all Course Submissions by Region and Institution Type

Region	Community College	Technical College	Total
Central	27	0	27
Gulf Coast	20	0	20
High Plains	5	0	5
Metroplex	35	0	35
Northwest	5	0	5
South	12	4	16
Southeast	7	8	15
Upper East	13	2	15
Upper Rio Grande	4	0	4
West	15	0	15
Total	**143**	**14**	**157**

Ratings

To determine the level of alignment, the modal (most frequent) instructor response was determined for each individual cross-disciplinary standard. This approach is consistent with the methodology employed in the TCCRI Phase II study. Each standard could have a score of 1 through 5 (from *most necessary* to *not necessary*). Depending upon the level of necessity selected, instructors then selected rationale statements that best explained their responses. (See Appendix D for a list of scale items and rationale statements.) Items left blank by instructors were treated as missing data. The overall

results of the faculty ratings are presented in the next section. For a detailed course-by-course breakdown of the results, please refer to the original Phase I CTE Study.

Results

Overall, the findings from this study indicate that every CCRS cross-disciplinary standard is aligned with at least one of the nine CTE courses analyzed. The level of alignment (including standards deemed either necessary for preparation or covered in the course) between the full set of cross-disciplinary standards, and the nine CTE course titles analyzed ranges from 100 percent in DFTG 1405 Technical Drafting to 66 percent in POFT 1301 Business English. While the level of alignment of the cross-disciplinary CCRS and any single course included varies, an examination across all CTE courses studied reveals high alignment between the cross-disciplinary skills across a range of typical entry-level CTE coursework. The overall alignment results are presented in Table 7.

Table 7: Summary of Alignment of Cross-disciplinary CCRS Deemed Necessary or Taught in the CTE Courses[2]

Course Title	Percent of Cross-Disciplinary Standards Necessary or Taught
ACNT 1303 Introduction to Accounting I	81%
BMGT 1303 Principles of Management	84%
DFTG 1309 Basic CAD	84%
DFTG 1405 Technical Drafting	100%
ITSC 1301 Introduction to Computers	97%
ITSC 1401 Introduction to Computers	84%
MRKG 1311 Principles of Marketing	98%
POFI 1301 Computer Applications I	76%
POFT 1301 Business English	66%

[2] *May not total to 100 percent due to rounding error.*

To determine the overall level of alignment, the modal ratings and rationale responses were combined. When looking at the specific rationales behind the instructor ratings, a pattern emerges. The typical (modal) rationale for all of the inconsistently aligned standards were described as being less necessary for successful preparation because the element was expected to be taught in the course. All of these inconsistently aligned standards were considered appropriate content. Since all of the inconsistently aligned standards were considered appropriate content for the courses, all aligned and inconsistently aligned standards were included in the overall results.

Highly Aligned Organizing Components and Performance Expectations

Of the 11 organizing components of the cross-disciplinary CCRS, five are highly aligned to CTE courses. Highly aligned is determined by alignment in each of the nine CTE courses included in this study. Table 8 below lists the five cross-disciplinary organizing components highly aligned across all CTE courses.

Table 8: Organizing Components Highly Aligned Across All CTE Courses by Rank

Rank	Cross-Disciplinary Standard	Total Responses	Total "Most" Responses	Total "More" Responses	Total Aligned Responses ("Most" or "More")	Percent Aligned Responses
1.	I.E. Work habits	138	72	59	131	95%
2.	I.D. Academic behaviors	137	56	67	123	90%
3.	I.F. Academic integrity	139	69	49	118	85%
4.	II.E. Technology	152	63	54	117	77%
5.	II.A. Reading across the curriculum	150	37	75	112	75%

Of the 45 performance expectations of the cross-disciplinary CCRS, 12 are highly aligned across the nine CTE courses. Table 9 below lists, in order of the strength of alignment, the highly aligned performance expectations. These aligned standards are split equally between Key Cognitive Skills and Foundational Skills, suggesting that each of these areas is equally valuable for preparation for success in CTE courses.

Table 9: Performance Expectations Highly Aligned Across All CTE Courses by Rank

Rank	Cross-Disciplinary Standard	Total Responses	Total "Most" Responses	Total "More" Responses	Total Aligned Responses ("Most" or "More")	Percent Aligned Responses
1.	I.E.1. Work independently.	145	75	59	134	92%
2.	I.D.2. Use study habits necessary to manage academic pursuits and requirements.	144	63	66	129	90%
3.	I.D.4. Persevere to complete and master tasks.	144	80	49	129	90%
4.	II.A.4. Identify the key information and supporting details.	153	54	82	136	89%
5.	I.F.4. Understand and adhere to ethical codes of conduct.	145	83	44	127	88%
6.	I.D.1. Self-monitor learning needs and seek assistance when needed.	143	57	68	125	87%
7.	II.E.4. Use technology appropriately.	153	66	56	122	80%
8.	II.A.2. Use a variety of strategies to understand the meanings of new words.	153	39	81	120	78%
9.	II.A.1. Use effective prereading strategies.	153	32	79	111	73%
10.	II.E.3. Use technology to communicate and display findings in a clear and coherent manner.	153	56	54	110	72%
11.	II.E.1. Use technology to gather information.	153	47	57	104	68%
12.	I.F.1. Attribute ideas and information to source materials and people.	144	45	48	93	65%

Significance

The findings of this study do indicate that it is reasonable to assume the cross-disciplinary skills are necessary for career readiness. It is predictable that some of the individual courses examined did have lower levels of alignment (such as POFT 1301 Business English). Individual courses are often narrow in scope and not representative of the full constellation of knowledge and skills developed in a full technical program associated with a given career path. This study tested the assumption that Key Cognitive and Foundational Skills are necessary for CTE preparation, and the data strongly suggest that students do need to possess a full array of cognitive and behavioral skills and strategies to be successful in a range of CTE courses.

The snapshot of CTE courses examined provides an informative picture of the knowledge and skills currently necessary for preparation in a range of entry-level CTE courses. For example, five of the CCRS cross-disciplinary organizing components were found to be highly aligned across all the CTE courses included in this study. These five organizing components include (in rank of order of alignment level): work habits, academic behaviors, academic integrity, technology, and reading across the curriculum. This sort of clear finding can help inform high school faculty immediately regarding the kinds of skills that are important to emphasize in courses containing students who seem likely to go on to CTE programs upon completion of high school. The identified organizing components could be emphasized throughout the four years of high school in all classes, with special attention to their implementation in high school CTE courses.

For postsecondary instructors and administrators, this study offers insight into current expectations and practice in a range of CTE courses. The results of this study are augmented by the CTE Reference Course Profiles that were also generated based upon the results of this study and a range of additional course documents collected. The results of this study, along with the Profiles, can potentially serve as a reference point for postsecondary instructors and course planners who have responsibility for entry-

level CTE courses. While instructors retain academic freedom for the way they teach their courses, the CTE Reference Course Profiles can provide an additional point of comparison instructors can use when creating or refining entry-level courses. The goal is to assist all CTE postsecondary programs to ensure that the entry-level courses they offer are aligned with the CCRS, contain appropriate content, and are cognitively challenging.

Finally, the study also suggests a potential gap between the current level of preparation of entering CTE students and an optimal level of preparation for future students. If the goal is to have more students attend and succeed in CTE programs, then proficiency with the Key Cognitive and Foundational Skills addressed by the cross-disciplinary standards could fundamentally enhance their success and enable CTE instructors to teach more efficiently and effectively. The end result would be courses in which students learn more and in which more students succeed.

Project #5: Alignment Between the CCRS and Placement Tests Commonly Used in Texas Postsecondary Institutions

Overview

Although the number of high school graduates pursuing higher education has increased during the last 30 years, between 30 percent and 60 percent of college freshmen require remedial education (NCES, 2004). A student may be college-eligible—that is, able to meet college admissions requirements—without being college ready (Conley, 2005). To be college ready, a student must attain a level of preparation to enroll and succeed—without remediation—in credit-bearing general education courses at the postsecondary level (Conley, 2007). Not only does remedial education cost an estimated $1 billion annually, but students requiring it are far less likely to graduate (ACT, 2005). As a result, significant attention is now directed to understanding and remedying the gap between what high school graduates know and are capable of and what entry-level college students need to know and are capable of.

Addressing the lack of preparedness of high school graduates for college-level coursework requires identifying the gaps in content between what is taught in high school and what is expected of students in college. It also requires appropriate and comprehensive measures for educators to monitor progress toward closing this gap.

One option for monitoring the developing college preparedness of high school students is through state assessments. Required state high school assessments often shape what gets emphasized in classrooms. Many states do not yet explicitly align the content knowledge and skills assessed by the state tests with those required for college success. Conley (2003) and Brown and Conley (2007) evaluated state tests and found that the content of state high school tests is inconsistently and only moderately aligned with college readiness standards in 20 states in mathematics and ELA. They find slightly more alignment with the ELA exams than with the mathematics exams, yet the

ELA exams align poorly or not at all in areas requiring higher levels of thinking, and the mathematics exams have the highest alignment in basic skills content areas. The findings describe the gap between student learning expectations and what they are expected to know to be ready for college and provide evidence that state tests are not aligned well enough with college readiness standards to be useful for providing feedback to high school students and teachers concerning college readiness. Consequently, many students graduating from high school and passing their state's high-stakes assessments are not sure how well prepared they are for postsecondary coursework.

College admissions and placement tests, then, become more important means for assessing college preparedness. Colleges and universities use scores on placement exams for a variety of purposes but most often for determining whether a student should have to take a remedial course before being allowed access to credit-bearing, college-level courses. Even though these exams are explicitly college-focused, evidence suggests that they are only moderately aligned with college readiness standards. Brown and Niemi (2007), for example, investigated the alignment of high school test content and community college test placement content (ACCUPLACER and COMPASS) and find that the content of ELA tests are adequately aligned but that mathematics tests are aligned only in depth-of-knowledge consistency. This study focuses on community college expectations, however, and the results may not generalize fully to four-year institutions. Achieve, Inc. (2007), also analyzes the alignment of admissions and placement exams in mathematics and English (ACT, SAT, ACCUPLACER, COMPASS, THEA) with the American Diploma Project (ADP) benchmarks. Their analysis, which may be considered more generalizable, finds that the ACT and SAT are generally more demanding than placement tests and demonstrate better coverage of a range of content knowledge. All the tests fell short of measuring the full set of knowledge and skills encompassed by the ADP benchmarks. Overall, the study finds that the tests place too much emphasis on low-level content taught earlier in a student's high school education

or even in middle school.

Texas is a leader in the movement to align high school curricula and assessments with college readiness expectations and was one of the first states to adopt a specific and comprehensive definition of college readiness describing essential knowledge and skill standards for all students in the state.

With the foundation of college and career readiness standards firmly in place, Texas is prepared to take the next steps in improving college readiness: to ascertain the alignment of postsecondary placement with the CCRS. By doing so, the THECB can ascertain the alignment of its measures of placement with the state standards and can modify placement procedures and practices so that incoming students who focus on meeting the CCRS while in high school are placed into college courses accordingly.

The purpose of the Texas Test Alignment Project (TAP) is to examine the alignment of THECB-approved college admission and placement tests used by Texas institutions of higher education to measure college readiness with the CCRS. As such, the goal of the current study is not to identify the *best* test to assess the CCRS, but to ascertain the discrepancy between current practice and the desired goal of complete measurement of the CCRS. This study addresses the following research objectives:

- To what extent do college admissions and placement tests assess the knowledge and skills specified in college and career readiness standards?
- Are any areas of college and career readiness standards not assessed by placement and admissions tests?
- How do the tests compare to college and career ready standards in terms of rigor and cognitive demand?

Methodology

Test items from the six THECB-approved placement and admissions tests used by Texas institutions of higher education to measure college readiness were obtained for the study. Content experts in mathematics and ELA first rated the rigor and depth of

knowledge required by the CCRS. The CCRS are organized into three levels: key content areas, organizing components, and performance expectations. The reviewers made their judgments at the level of performance expectations by rating the cognitive complexity of each performance expectation and then determining whether each test item from each of the designated tests corresponds with one or more performance expectations. Every reviewer determined the relationship between each test item and the corresponding performance expectations. The results show the average cognitive complexity ratings and describe the relationship between performance expectations and test item's content (their categorical concurrence) and, when they match, whether rigor and depth of knowledge between the performance expectation and the test item is appropriate.

Researchers have developed many ways to assess alignment (Rothman, 2004; Webb, 1997, 1999; Porter, 2002; ACHIEVE, 2000, 2001, and 2003; Wixson, Fisk, Dutro, and McDaniel, 2002). Webb's method is one of the more widely used ways to determine alignment between test items and educational standards. His approach however, is often modified by alignment researchers (Impara, 2001).

This study also is based on Webb's methods, but were modified to better address the project's objectives. The primary deviation is to compute each metric across raters rather than by computing alignment metrics for each rater and then averaging them. Although the estimates may be slightly less sensitive to differences in reviewer ratings, they highlight the alignment between each of the tests and the CCRS—as this alignment is a core objective of the study.

- **Categorical concurrence** determines the extent that test items correspond to the CCRS. Tests with more than six items assessing a standard are considered to demonstrate *categorical concurrence* with that standard.
- **Depth-of-knowledge (DOK) consistency** is measured by comparing the DOK level required of the test item (as determined by the reviewers) with the DOK required to meet the standard (as determined by reviewers). The recommended benchmark is that at least one-half the assessment items are at or above the

DOK required by the corresponding standard.

- **Range of knowledge** is the extent to which the CCRS are assessed by items on a test. This criterion is typically measured as the average percent of standards addressed by one or more items on each test (across reviewers).

Webb includes a fourth measure, *balance of representation*, to describe the extent that assessment items are evenly distributed across learning objectives. Previous research provides evidence that this is highly redundant with the range of knowledge measure (e.g., Brown and Conley, 2007). Furthermore, when there is great variation in test distribution (e.g., the number of items provided to represent each test), as in the current study, this distribution metric is more likely to be skewed and not be directly comparable across tests. For these reasons, balance of representation is not reported here.

Results

Reviewer Agreement

As is typical with alignment studies, the ratings of six experts were used as the basis for alignment computations and decisions. Six is the standard number of reviewers required in similar alignment studies to obtain sufficient reliability (Herman, Webb and Zuniga, 2005; Webb 1997, 1999, and 2002). Consistent with the treatment of rigor ratings and cognitive demand ratings as quasi-quantitative measures (rather than as strictly categorical measures), a generalizability analysis was conducted with items and standards crossed by reviewers (Shavelson and Webb, 1991).

The *absolute error variance* indicates the consistency of item-and-standard ratings across reviewers. The phi coefficient, called the *index of dependability* (Shavelson and Webb, 1991), can be considered a reliability-like coefficient for absolute decisions (Herman, Webb and Zuniga, 2007; Mushquash and O'Connor, 2006; Thompson, 2003). The phi coefficient in this context represents decision consistency over parallel rating situations. For example, a phi coefficient of 0.80 indicates that, if the same study was recreated and repeated over multiple occasions, one could expect the same pattern of

ratings 80% of the time. Coefficients are interpreted similarly to reliability coefficients in that values of 0.80 and higher indicate high generalizability.

Table 10 shows the generalizability results for the rigor and cognitive-demand ratings of the mathematics and English items across assessments. The phi coefficients for the cognitive-demand ratings are close to or above the conventional 0.80 criterion for reliability. The phi coefficients for the rigor ratings were lower than those for the cognitive-demand ratings, with none of the coefficients reaching the conventional criterion for reliability. The six reviewers obtained an acceptable level of dependability for estimating mathematics and ELA items' level of cognitive demand, but were much less consistent in their rating of the level of rigor.

Table 10. G-Study Coefficients for Mathematics and ELA Items across Test

Subject	Items	Cognitive Demand		Rigor	
		Phi Coefficients	Absolute Error Variance	Phi Coefficients	Absolute Error Variance
Mathematics	1,460	0.859	0.035	0.505	0.007
ELA	1,239	0.703	0.053	0.446	0.02

Table 11 shows the generalizability results for the cognitive demand ratings and rigor ratings of the mathematics and ELA CCRS performance expectations. As with the item ratings, the phi coefficients for the performance expectation cognitive-demand ratings are close to or above the conventional 0.80 criterion for reliability. The phi coefficients for the rigor ratings were lower than those for the cognitive demand ratings, with none of the coefficients reaching the conventional criterion for fully satisfactory reliability. These results indicate that the six reviewers did reach an acceptable level of dependability for estimating mathematics and ELA standards' level of cognitive demand but not their level of rigor.

Table 11. G-Study Coefficients for Mathematics and ELA CCRS Performance Expectations Ratings

Subject	Standards	Cognitive Demand		Rigor	
		Phi Coefficients	Absolute Error Variance	Phi Coefficients	Absolute Error Variance
Mathematics	115	0.855	0.100	0.566	0.038
ELA	119	0.724	0.095	0.556	0.060

Overall, these results indicate higher rater reliability for mathematics item ratings and standard ratings than for ELA item ratings and standard ratings. Additionally, the results indicate higher rater reliability for cognitive-demand ratings than for rigor ratings. Results are consistent with findings from other similar studies using the same number of reviewers (Herman, Webb, and Zuniga, 2005, Brown and Conley, 2007, Brown and Niemi, 2007). Interestingly, Herman, Webb, and Zuniga also reported that ratings of cognitive demand were more reliable than were ratings of centrality (similar to rigor in that centrality evaluated the extent that a standard was essential to a topic).

A *D-study* (decision study) was also conducted, which determined the gains in reliability expected if the number of reviewers was increased in future studies. The results indicate that, in most cases, increasing the number of reviewers from 6 to 10–15 would result in only moderate gains in reliability (as measured by the phi coefficient).

Findings

Study findings are described below beginning with a summary of the rigor and cognitive demand of the CCRS and the tests, including:

- Average rigor and cognitive demand of CCRS organizing components
- Average rigor and cognitive demand of tests, across items

Also described is the alignment between the test items and the CCRS, specifically:

- The total number of matches or *hits* for each performance expectation
- *Zero-match* performance expectations, or those not assessed by any of the tests

- *Categorical concurrence*, modified to describe when the number of items assessing a performance expectation on each test is six or more for mathematics and ELA tests
- Depth-of-knowledge consistency for mathematics and ELA tests, describing average differences in rigor and cognitive-demand ratings
- Range of knowledge for mathematics and ELA tests identifying the total number of matches for each performance expectation by test

Rigor and Cognitive Demand

Texas Career and College Readiness Standards Rigor and Cognitive Demand

Reviewers provided rigor and cognitive-demand ratings for each of the CCRS performance expectations. Each reviewer's ratings were averaged across the expanded performance expectations and then averaged across reviewers to generate rigor and cognitive-demand scores for each item and then for each performance expectation.

Table 12 provides the average of reviewers' rigor and cognitive-demand ratings across performance expectation for each organizing component of the CCRS cross-disciplinary skills. On average, the reviewers found the cross-disciplinary skills to be at or below the level at which an entry-level college student should perform (between 1 and 2 on the rigor scale). Reviewers rate the key cognitive strategies at a higher level of rigor and cognitive demand than the foundational skills. Note the similar patterns in findings between rigor and cognitive demand; however, given the higher reliability of the cognitive demand ratings, somewhat greater consideration should be given to cognitive demand ratings than to rigor ratings.

Table 12. Average Rigor and Cognitive Demand for Cross-Disciplinary Skills by Organizing Component

Organizing Component	Average Rigor (3-point scale)			Average Cognitive Demand (4-point scale)		
	Mean	*N*	SD	Mean	*N*	SD
Key Cognitive Strategies						
Intellectual curiosity	2.04	2	0.177	3.29	2	0.059
Reasoning	1.92	4	0.180	3.35	4	0.299

Organizing Component	Average Rigor (3-point scale)			Average Cognitive Demand (4-point scale)		
	Mean	*N*	SD	Mean	*N*	SD
Problem solving	1.89	3	0.192	3.33	3	0.220
Academic behaviors	1.40	4	0.125	2.38	4	0.285
Work habits	1.13	2	0.059	2.46	2	0.059
Academic integrity	1.60	4	0.197	2.58	4	0.642
Overall Key Cognitive Strategies Mean	**1.67**	**19**	**0.329**	**2.88**	**19**	**0.549**
Foundational Skills						
Reading across the curriculum	1.23	8	0.165	2.05	8	0.478
Writing across the curriculum	1.14	3	0.127	2.00	3	0.500
Research across the curriculum	1.59	8	0.225	2.59	8	0.384
Use of data	1.81	3	0.268	2.94	3	0.459
Technology	1.29	4	0.144	1.96	4	0.567
Overall Foundational Skills Mean	**1.41**	**26**	**0.287**	**2.30**	**26**	**0.554**

Note: Averages were computed for each performance expectation across reviewers and then were averaged across performance expectations within each organizing component. "N" refers to the number of performance expectations within each organizing component. The standard deviations (SD) describe the variability of the performance expectations within organizing components. Shaded cells indicate the organizing components with the highest average rigor or cognitive demand ratings.

Within the cross-disciplinary skills, the key cognitive strategies were on average, more rigorous and cognitively demanding than the foundational skills.

Table 13 provides the average of reviewers' rigor and cognitive-demand ratings across performance expectations for each of the mathematics organizing components. The rigor ratings are slightly lower for mathematics than for the cross-disciplinary skills. On average, the reviewers rated the mathematics standards as below the level at which an entry-level college student should be expected to perform (near 1 on the rigor scale).

Table 13. Average Rigor and Cognitive Demand for Mathematics by Organizing Component

Organizing Component	Average Rigor (3-point scale)			Average Cognitive Demand (4-point scale)		
	Mean	*N*	SD	Mean	*N*	SD
Numeric Reasoning						
Number representation	1.08	2	0.118	1.00	2	0.000
Number operations	1.17	1		1.00	1	
Number sense and number concepts	1.00	1		1.83	1	

Organizing Component	Average Rigor (3-point scale)			Average Cognitive Demand (4-point scale)		
	Mean	*N*	SD	Mean	*N*	SD
Overall Numeric Reasoning	**1.08**	**4**	**0.096**	**1.21**	**4**	**0.417**
Algebraic Reasoning						
Expressions and equations	1.17	1		1.67	1	
Manipulating expression	1.00	1		1.17	1	
Solving equations, inequalities, and systems of equations	1.08	2	0.118	1.58	2	0.589
Representations	1.08	2	0.118	2.00	2	0.000
Overall Algebraic Reasoning	**1.08**	**6**	**0.091**	**1.67**	**6**	**0.408**
Geometric Reasoning						
Figures and their properties	1.11	3	0.192	1.78	3	1.072
Transformations and symmetry	1.11	3	0.192	1.61	3	0.770
Connections between geometry and other mathematical content strands	1.17	3	0.167	1.83	3	0.167
Logic and reasoning in geometry	1.17	2	0.000	2.42	2	0.825
Overall Geometric Reasoning	**1.14**	**11**	**0.146**	**1.86**	**11**	**0.710**
Measurement Reasoning						
Measurement involving physical and natural attributes	1.00	1		1.17	1	
Systems of measurement	1.00	2	0.000	1.00	2	0.000
Measurement involving geometry and algebra	1.06	3	0.096	1.22	3	0.385
Measurement involving statistics and probability	1.25	2	0.118	1.92	2	1.296
Overall Measurement Reasoning	**1.08**	**8**	**0.126**	**1.33**	**8**	**0.649**
Probabilistic Reasoning						
Counting principles	1.17	1		1.17	1	
Computation and interpretation of probabilities	1.33	2	0.236	1.50	2	0.471
Overall Probabilistic Reasoning	**1.28**	**3**	**0.192**	**1.39**	**3**	**0.385**
Statistical Reasoning						
Data collection	1.67	1		2.50	1	
Describe data	1.04	4	0.083	1.54	4	0.479
Read, analyze, interpret, and draw conclusions from data	1.50	4	0.136	2.67	4	0.304
Overall Statistical Reasoning	**1.31**	**9**	**0.282**	**2.15**	**9**	**0.674**
Functions						
Recognition and representation of functions	1.00	2	0.000	1.17	2	0.236
Analysis of functions	1.08	2	0.118	2.25	2	0.589
Model real world situations with functions	1.33	2	0.471	2.33	2	0.707
Overall Functions	**1.14**	**6**	**0.267**	**1.92**	**6**	**0.721**

Organizing Component	Average Rigor (3-point scale)			Average Cognitive Demand (4-point scale)		
	Mean	*N*	SD	Mean	*N*	SD
Problem Solving and Reasoning						
Mathematical problem solving	1.30	5	0.139	3.10	5	0.418
Logical reasoning	1.50	2	0.236	3.50	2	0.471
Real world problem solving	1.33	3	0.167	2.83	3	0.601
Overall Problem Solving and Reasoning	**1.35**	**10**	**0.166**	**3.10**	**10**	**0.492**
Connections						
Connections among the strands of mathematics	1.25	2	0.118	2.67	2	0.000
Connections of mathematics to nature, real-world situations, and everyday life	1.50	3	0.167	2.50	3	0.167
Overall Connections	**1.40**	**5**	**0.190**	**2.57**	**5**	**0.149**
Communication and Representation						
Language, terms, and symbols of mathematics	1.06	3	0.096	2.22	3	0.674
Interpretation of mathematical work	1.25	2	0.118	2.25	2	0.354
Presentation and representation of mathematical work	1.33	3	0.167	2.61	3	0.509
Overall Communication and Representation	**1.21**	**8**	**0.173**	**2.38**	**8**	**0.510**

Note: Averages were computed for each performance expectation across reviewers and then were averaged across performance expectations within each organizing component. "N" refers to the number of performance expectations within each organizing component. The standard deviations (SD) describe the variability of the performance expectations within organizing components. Shaded cells indicate the organizing components with the highest average rigor or cognitive demand ratings.

The organizing components with the highest average cognitive demand ratings belong to the statistical reasoning, problem solving and reasoning, and statistical reasoning key content areas, including the connections and problem solving and reasoning, data collection, read, analyze, interpret, and draw conclusions from data, logical reasoning, and connections of mathematics to nature, real-world situations, and everyday life organizing components. The organizing components with the highest cognitive demand ratings tend also to be high in rigor.

Table 14 provides the average of reviewers' rigor and cognitive-demand ratings across performance expectations for each of the ELA organizing components. On average, the ELA standards are at the level an entry-level college student should perform (close to 2 on the rigor scale).

Table 14. Average Rigor and Cognitive Demand for English/Language Arts by Organizing Component

Organizing Component	Average Rigor			Average Cognitive Demand		
	Mean	*N*	SD	Mean	*N*	SD
Writing						
Compose a variety of texts that demonstrate clear focus, the logical development of ideas in well-organized paragraphs, and the use of appropriate language that advances the author's purpose	1.83	5	0.199	2.42	5	0.391
Overall Writing	**1.83**	**5**	**0.199**	**2.42**	**5**	**0.391**
Reading						
Locate explicit textual information and draw complex inferences, analyze, and evaluate the information within and across texts of varying lengths	1.59	11	0.277	2.35	11	0.490
Understand new vocabulary and concepts and use them accurately in reading, speaking, and writing	1.22	3	0.096	1.50	3	0.333
Describe, analyze, and evaluate information within and across literary and other texts from a variety of cultures and historical periods	1.83	4	0.381	2.51	4	0.790
Explain how literary and other texts evoke personal experience and reveal character in particular historical circumstances	1.92	2	0.589	2.75	2	0.825
Overall Reading	**1.62**	**20**	**0.355**	**2.30**	**20**	**0.637**
Research						
Formulate topic and questions	1.53	3	0.127	2.47	3	0.173
Select information from a variety of sources	1.81	4	0.336	2.60	4	0.448
Produce and design a document	1.75	2	0.118	2.71	2	0.059
Overall Research	**1.70**	**9**	**0.257**	**2.58**	**9**	**0.303**

Note: Averages were computed for each performance expectation across reviewers and then were averaged across performance expectations within each organizing component. Standard deviations describe the variability of the performance expectations within organizing components. Shaded cells indicate the organizing components with the highest average rigor or cognitive demand ratings.

For ELA, writing and research are rated as more rigorous and cognitively demanding than reading, and the average rigor and cognitive demand for the ELA organizing components are higher than for the mathematics and the cross-disciplinary skill organizing components.

Test Rigor and Cognitive Demand

The reviewers found tests overall to be nearly identical in their level of rigor, which on average was below the level of the CCRS and below the level at which an entry-level

college student should perform. This should not come as a surprise because admissions and placement tests must cover a range of knowledge and skill levels to uncover test takers who are below the level of a credit-bearing college course. To do so requires at least some items that are below college level. This explains why, in most cases, the average test items were less rigorous than the standards.

Table 15 describes the overall average rigor ratings for each of the tests by subject.

Table 15. Average Rigor for Mathematics and English/Language Arts by Test

Test	Average Mathematics Item Rigor (Averaged across rater and items)			Average ELA Item Rigor (Averaged across rater and items)		
	Mean	*N*	SD	Mean	*N*	SD
A	1.08	248	0.139	1.21	162	0.142
B	1.03	180	0.098	1.16	347	0.179
C	1.02	528	0.070	1.08	240	0.110
D	1.06	351	0.146	1.08	240	0.158
E	1.08	100	0.124	1.21	167	0.178
F	1.05	53	0.107	1.26	83	0.190

There is greater variability in the overall cognitive-demand ratings. Table 16 describes the average cognitive-demand ratings for each test by subject.

Table 16. Average Cognitive Demand for Mathematics and English/Language Arts by Test

Test	Average Mathematics Item Cognitive Demand (Averaged across rater and item)			Average ELA Item Cognitive Demand (Averaged across rater and item)		
	Mean	*N*	SD	Mean	*N*	SD
A	1.39	248	0.376	1.64	162	0.352
B	1.84	180	0.487	1.37	347	0.427
C	1.50	528	0.502	1.28	240	0.341
D	1.56	351	0.475	1.42	240	0.389
E	2.05	100	0.369	1.46	167	0.42
F	1.73	53	0.463	1.59	83	0.421

Within the ELA tests, the constructed-response writing prompts received higher rigor and cognitive demand ratings than did the multiple-choice reading items (with some variability in ratings by test). These were also more cognitively demanding and were the

only items to consistently require the highest level of cognitive demand.

Alignment Between Test Items and CCRS

Test Coverage of CCRS

Reviewers identified a total of 57,391 *hits* or matches between the 2,699 test items and the 149 CCRS performance expectations. As expected, the test items assessed multiple standards, ranging from 15 to 34. Across tests, the average number of matches per test item ranged from 18 to 34 for mathematics and from 15 to 18 for ELA.

Most- and Least-Assessed CCRS Organizing Components

The most hits occurred for the key content areas of writing, problem solving and reasoning, algebraic reasoning, and foundational skills. The standards with the fewest test items assessing them are research, probabilistic reasoning, and statistical reasoning.

Zero-Match Expectations

Expectations not assessed by any test are called *zero-match* performance expectations. Table 17 identifies the CCRS items not assessed by a single test item on any of the tests.

Table 17. Zero-Match CCRS Performance Expectations

Key Content	Organizing Components	Performance Expectation Not Assessed by a Single Test Item
Mathematics: **Statistical Reasoning**	A. Data collection	1. Plan a study
	C. Read, analyze, interpret, and draw conclusions from data	3. Analyze relationships between paired data using spreadsheets, graphing calculators, or statistical software
		4. Recognize reliability of statistical results
ELA: **Reading**	A. Locate explicit textual information and draw complex inferences, analyze, and evaluate the information within and across texts of varying lengths	8. Compare and analyze how generic features are used across texts
	B. Understand new vocabulary and concepts and use them accurately in reading, speaking, and writing	2. Apply knowledge of roots and affixes to infer the meanings of new words
		3. Use reference guides to confirm the meanings of new words or concepts

Key Content	Organizing Components	Performance Expectation Not Assessed by a Single Test Item
	C. Describe, analyze, and evaluate information within and across literary and other texts from a variety of cultures and historical periods	1. Read a wide variety of texts from American, European, and world literatures
		3. Analyze works of literature for what they suggest about the historical period and cultural contexts in which they were written
	D. Explain how literary and other texts evoke personal experience and reveal character in particular historical circumstances	2. Analyze the influence of myths, folktales, fables, and classical literature from a variety of world cultures on later literature and film
ELA: **Research**	A. Formulate topic and questions	1. Formulate research questions
		2. Explore a research topic
		3. Refine research topic and devise a timeline for completing work
	B. Select information from a variety of sources	4. Use source material ethically
	C. Produce and design a document	1. Design and present an effective product
		2. Use source material ethically

Note: The CCRS include "Use source material ethically" in both the select information from a variety of sources and produce and design a document organizing components.

Many of these appear to be skills best assessed by means other than multiple-choice or even constructed-response type test items: plan a study, use reference guides to confirm the meanings of new words, formulate research questions, explore a research topic, use source material ethically, etc. These are not included as in subsequent descriptive tables. However, they are counted when computing measures where the total number of performance expectations is a denominator, such as with categorical concurrence.

Categorical Concurrence

Categorical concurrence describes the degree to which the items in a test correspond with one or more of the CCRS. The criterion of categorical concurrence is met if the same categories of content appear in both the assessment and the standards; to produce an acceptable level of reliability for assessment scores, Webb recommends that at least six items assess each performance expectation. Table 18 describes the percent of performance expectations demonstrating categorical concurrence across

rater (i.e., that have at least six items assessing that performance expectation) within each organizing component for each mathematics test.

Table 18. Categorical Concurrence by Key Content for Mathematics Tests

Key Content	Organizing Component (Number of performance expectations)	Percent of Performance Expectations that Reached Categorical Concurrence for this Test in Mathematics					
		A	B	C	D	E	F
Numeric Reasoning	A. Number representation (2)	50%	50%	100%	50%	50%	0%
	B. Number operations (1)	100%	100%	100%	100%	100%	100%
	C. Number sense and number concepts (1)	100%	100%	100%	100%	0%	0%
	Numeric Reasoning Overall	**83%**	**83%**	**100%**	**83%**	**50%**	**33%**
Algebraic Reasoning	A. Expressions and equations (1)	100%	100%	100%	100%	100%	0%
	B. Manipulating expression (1)	100%	100%	100%	100%	100%	100%
	C. Solving equations, inequalities, and systems of equations (2)	100%	50%	100%	100%	100%	50%
	D. Representations (2)	100%	100%	100%	100%	100%	100%
	Algebraic Reasoning Overall	**100%**	**88%**	**100%**	**100%**	**100%**	**63%**
Geometric Reasoning	A. Figures and their properties (2)	100%	100%	100%	100%	66%	66%
	B. Transformations and symmetry (3)	0%	66%	33%	33%	33%	0%
	C. Connections between geometry and other mathematical content strands (3)	66%	66%	66%	66%	66%	66%
	D. Logic and reasoning in geometry (2)	0%	100%	100%	100%	0%	0%
	Geometric Reasoning Overall	**42%**	**83%**	**75%**	**75%**	**41%**	**33%**
Measurement Reasoning	A. Measurement involving physical and natural attributes (1)	100%	0%	0%	0%	0%	0%
	B. Systems of measurement (2)	0%	50%	100%	0%	0%	0%
	C. Measurement involving geometry and algebra (3)	66%	66%	66%	100%	66%	0%
	D. Measurement involving statistics and probability (2)	0%	0%	0%	0%	0%	0%
	Measurement Reasoning Overall	**42%**	**29%**	**42%**	**25%**	**17%**	**0%**
Probabilistic Reasoning	A. Counting principles (1)	0%	0%	0%	0%	100%	0%
	B. Computation and interpretation of probabilities (2)	0%	0%	0%	0%	0%	0%
	Probabilistic Reasoning Overall	**0%**	**0%**	**0%**	**0%**	**50%**	**0%**
Statistical Reasoning	A. Data collection (1)	0%	0%	0%	0%	0%	0%
	B. Describe data (4)	0%	25%	25%	25%	100%	0%

Key Content	Organizing Component (Number of performance expectations)	Percent of Performance Expectations that Reached Categorical Concurrence for this Test in Mathematics					
		A	B	C	D	E	F
	C. Read, analyze, interpret, and draw conclusions from data (4)	0%	0%	0%	0%	25%	0%
	Statistical Reasoning Overall	**0%**	**13%**	**13%**	**13%**	**63%**	**0%**
Functions	A. Recognition and representation of functions (2)	50%	0%	50%	50%	0%	0%
	B. Analysis of functions (2)	100%	100%	100%	100%	100%	50%
	C. Model real world situations with functions (2)	50%	100%	50%	100%	100%	100%
	Functions Overall	**67%**	**67%**	**67%**	**83%**	**67%**	**50%**
Problem Solving and Reasoning	A. Mathematical problem solving (5)	80%	80%	80%	80%	80%	80%
	B. Logical reasoning (2)	0%	50%	50%	50%	50%	50%
	C. Real world problem solving (3)	33%	100%	33%	33%	33%	33%
	Problem Solving and Reasoning Overall	**38%**	**77%**	**54%**	**54%**	**54%**	**54%**
Communication and Representation	A. Language, terms, and symbols of mathematics (3)	66%	100%	100%	100%	66%	66%
	B. Interpretation of mathematical work (2)	50%	100%	50%	100%	50%	100%
	C. Presentation and representation of mathematical work (3)	0%	0%	33%	33%	33%	33%
	Communication and Representation Overall	**39%**	**67%**	**61%**	**78%**	**50%**	**66%**
Connections	A. Connections among the strands of mathematics (2)	50%	100%	50%	50%	50%	50%
	B. Connections of mathematics to nature, real-world situations, and everyday life (3)	33%	66%	33%	33%	33%	33%
	Connections Overall	**42%**	**83%**	**42%**	**42%**	**42%**	**42%**
Key Cognitive Strategies	A. Intellectual curiosity (2)	0%	0%	0%	0%	0%	0%
	B. Reasoning (4)	0%	0%	0%	0%	0%	0%
	C. Problem solving (3)	66%	66%	66%	33%	33%	66%
	D. Academic behaviors (4)	0%	0%	0%	0%	0%	0%
	E. Work habits (2)	0%	0%	0%	0%	0%	0%
	F. Academic Integrity (4)	0%	0%	0%	0%	0%	0%
	Key Cognitive Strategies Overall	**11%**	**11%**	**11%**	**6%**	**6%**	**11%**
Foundational Skills	A. Reading across the curriculum (8)	12%	12%	25%	12%	12%	12%
	B. Writing across the curriculum (3)	0%	0%	0%	0%	0%	0%

Key Content	Organizing Component (Number of performance expectations)	Percent of Performance Expectations that Reached Categorical Concurrence for this Test in Mathematics					
		A	B	C	D	E	F
	C. Research across the curriculum (8)	0%	0%	0%	0%	0%	0%
	D. Use of data (3)	0%	0%	0%	0%	0%	0%
	E. Technology (4)	0%	0%	0%	0%	0%	0%
	Foundational Skills Overall	**2%**	**2%**	**5%**	**2%**	**2%**	**2%**
Overall	**Average % categorical concurrence**	**39%**	**50%**	**48%**	**47%**	**45%**	**30%**

Note: Average percent categorical concurrence by test computed as the average of the percents across organizing components. Categorical concurrence is defined as a test having six or more unique test items assessing a performance expectation and the percents shown are the percent of performance expectations within an organizing component that attained categorical concurrence for each test. Shaded cells indicate the recommended benchmark was met.

Reviewers of the mathematics CCRS found categorical concurrence highest across all tests for algebraic reasoning, functions, and numeric reasoning components and lowest for the foundational skills. All tests attained categorical concurrence in algebraic reasoning, functions and communications and representations. Across all tests, the lowest categorical concurrence was observed in probabilistic reasoning, statistical reasoning (with one exception), and the cross-disciplinary skills (with the exception of the problem solving and—to a lesser extent—reading across the curriculum expectations, which were moderately assessed by the tests).

Although some tests have unique strengths, results are somewhat consistent across tests: organizing components low in categorical concurrence tend to be low across all tests, organizing components high in categorical concurrence tend to be high across all tests. This suggests that, with minor gaps or areas of unique coverage, the placement and admissions tests provide similar content coverage relative to the CCRS.

Table 19 describes the percent of performance expectations within each organizing component for which categorical concurrence was established for each English/language arts test. For the English/language arts CCRS, categorical concurrence is higher for writing than for the foundational skills and reading.

It is lowest for research.

Table 19. Categorical Concurrence by Key Content for English/Language Arts Tests

Key Content	Organizing Component	Percent of Performance Expectations that Reached Categorical Concurrence for this Test in ELA					
		A	B	C	D	E	F
Writing	I.A. Compose a variety of texts that demonstrate clear focus, the logical development of ideas in well-organized paragraphs, and the use of appropriate language that advances the author's purpose. (5)	100%	80%	100%	100%	80%	80%
	Writing Overall	**100%**	**80%**	**100%**	**100%**	**80%**	**80%**
Reading	II.A. Locate explicit textual information and draw complex inferences, analyze, and evaluate the information within and across texts of varying lengths. (11)	55%	73%	46%	46%	46%	46%
	II.B. Understand new vocabulary and concepts and use them accurately in reading, speaking, and writing. (3)	0%	33%	33%	33%	33%	33%
	II.C. Describe, analyze, and evaluate information within and across literary and other texts from a variety of cultures and historical periods. (4)	0%	25%	0%	0%	0%	0%
	II.D. Explain how literary and other texts evoke personal experience and reveal character in particular historical circumstances.	0%	0%	0%	0%	0%	0%
	Reading Overall	**14%**	**33%**	**20%**	**20%**	**20%**	**20%**
Research	V.B. Select information from a variety of sources. (4)	0%	0%	0%	0%	0%	0%
	Research Overall	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
Key Cognitive Strategies	A. Intellectual curiosity (2)	0%	0%	0%	0%	0%	0%
	B. Reasoning (4)	25%	25%	0%	25%	25%	25%
	C. Problem solving (3)	33%	33%	33%	33%	33%	33%
	D. Academic behaviors (4)	25%	25%	25%	50%	25%	25%
	E. Work habits (2)	0%	0%	0%	0%	0%	0%
	F. Academic integrity (4)	0%	0%	0%	0%	0%	0%
	Key Cognitive Strategies Overall	**14%**	**14%**	**10%**	**18%**	**14%**	**14%**
Foundational Skills	A. Reading across the curriculum (8)	50%	75%	63%	63%	63%	63%
	B. Writing across the curriculum (3)	66%	66%	66%	66%	66%	66%
	C. Research across the curriculum (8)	0%	0%	0%	0%	0%	0%
	D. Use of data (3)	0%	0%	0%	0%	0%	0%
	E. Technology (4)	0%	0%	0%	0%	0%	0%

Key Content	Organizing Component	Percent of Performance Expectations that Reached Categorical Concurrence for this Test in ELA					
		A	B	C	D	E	F
	Foundational Skills Overall	23%	28%	26%	26%	26%	26%
Overall	Average % categorical concurrence	30%	31%	31%	33%	28%	28%

Note: Average percent categorical concurrence by test is computed as the average of the percents across organizing components. The percents described are the percent of performance expectations within an organizing component that attained categorical concurrence.

Within the key content areas for reading, one organizing component accounts for nearly all of the categorical concurrence observed: locate explicit textual information and draw complex inferences, analyze, and evaluate the information within and across texts of varying lengths. Within the foundational skills, all tests demonstrate categorical concurrence on the reading and writing across the curriculum organizing components, but no tests demonstrate categorical concurrence with any other organizing component within this key content area.

As with mathematics, the organizing components that are lower in categorical concurrence trend lower across all tests, and organizing components higher in categorical concurrence trend higher across all tests, indicating that content coverage is similar across tests.

Depth-of-Knowledge Consistency

To determine the relationship of rigor and cognitive demand between test-items and the CCRS, the differences between items and performance-expectation rigor and cognitive-demand rating was computed for all matches. Table 20 summarizes the differences between the depth of knowledge ratings for test items and the performance expectations.

Table 20. Average Differences Between Test-Item Rigor and Cognitive Demand and the Rigor and Cognitive Demand of the Performance Expectations they Assess

	Matches Between Test Items and Performance Expectations	Average Difference in Cognitive Demand (item cognitive demand minus performance-expectation cognitive demand)		Average Difference in Rigor (item rigor minus performance-expectation rigor)	
Test	**Number**	**Mean**	**SD**	**Mean**	**SD**
Mathematics					
A	4,571	-0.38	0.787	-0.10	0.263
B	5,965	-0.18	0.805	-0.17	0.228
C	12,592	-0.25	0.800	-0.16	0.215
D	9,543	-0.36	0.806	-0.12	0.244
E	3,409	-0.16	0.780	-0.13	0.232
F	1,622	-0.44	0.767	-0.15	0.243
English					
A	2,720	-0.54	0.518	-0.33	0.330
B	5,676	-0.73	0.579	-0.31	0.340
C	3,566	-0.82	0.538	-0.40	0.310
D	3,497	-0.64	0.583	-0.38	0.325
E	2,882	-0.67	0.596	-0.28	0.337
F	1,348	-0.56	0.561	-0.23	0.339

Note: Average differences are the average of the individual differences between test items and performance expectations for all matches identified on each test. Negative means indicate that on average, the reviewers rated the test items lower in cognitive demand or rigor than the performance expectations they assessed. We note that significance tests are not often used in typical alignment study methodology and that were they to be applied, many confidence intervals would include zero.

Although all differences are small, the difference between standards and test items in cognitive demand and rigor is relatively larger for ELA tests than for mathematics tests. The differences are negative in most cases because the performance expectations are overall, more rigorous and cognitively demanding than the test items, as is expected due to the range of rigor required by the tests to assess a range of student proficiency. The smaller differences indicate closer correspondence between the test items and their performance expectations.

While on average, the standards were more rigorous than the test items, this was not the case with all performance expectations. For rigor in mathematics, test items rank higher than the CCRS in the following categories:

- Numeric reasoning, including 1) number representation and 2) number sense and concepts
- Algebraic reasoning, including 1) manipulating expressions and 2) solving equations, inequalities, and systems of equations
- Measurement reasoning, including 1) measurement involving physical and natural attributes and 2) systems of measurement
- Functions, including 1) recognition and representation of functions and 2) analysis of functions
- Communication and representation, including language, terms, and symbols of mathematics

For ELA, the only performance expectation that is rated lower in rigor than assessment items is writing.

In cognitive demand for both mathematics and ELA, the CCRS are more challenging on average than are the test items. The exceptions to this, where test items are more challenging, are:

- Numeric reasoning, including 1) number representation, 2) number operations
- Algebraic reasoning, including 1) manipulating expressions, 2) solving equations, inequalities, and systems of equations, and 3) representations
- Measurement reasoning, including 1) measurement involving physical and natural attributes, 2) systems of measurement and 3) measurement involving geometry and algebra
- Probabilistic reasoning, including 1) counting principles and 2) computation and interpretation of probabilities
- Functions, including recognition and representation of functions

Overall, then, the CCRS are more rigorous and demanding than the corresponding test items, except specific mathematics performance expectations as indicated above.

Range of Knowledge

In addition to categorical concurrence, the alignment between the CCRS and the

assessments are described using range of knowledge. The range of knowledge correspondence criterion examines the alignment of assessment items to expectations within the CCRS. It describes how a breadth of knowledge the standards expect of students corresponds to knowledge needed to correctly answer test items. Range of knowledge is calculated as the percent of organizing components that have at least one item assessing each performance expectation. This is summarized across reviewers, and the suggested benchmark is for a test to have one or more items assess at least half of the performance expectations within an organizing component.

Table 21 describes the percent of performance expectations that are assessed by at least one mathematics test item (summed across all reviewers). Recall that each test item assesses more than one performance expectation. On average, across all key content, the mathematics tests covered between 58 to 81 percent of the content described by the CCRS.

Table 21. Range of Knowledge (Using Total Number of Matches) by Mathematics Test

Key Content	Organizing Component	Percent of Mathematics Performance Expectations Assessed By At Least One Test Item					
		A	B	C	D	E	F
Numeric Reasoning	A. Number representation	50%	50%	100%	100%	100%	50%
	B. Number operations	100%	100%	100%	100%	100%	100%
	C. Number sense and number concepts	100%	100%	100%	100%	100%	100%
	Numeric reasoning Overall	**83%**	**83%**	**100%**	**100%**	**100%**	**83%**
Algebraic Reasoning	A. Expressions and equations	100%	100%	100%	100%	100%	100%
	B. Manipulating expression	100%	100%	100%	100%	100%	100%
	C. Solving equations, inequalities, and systems of equations	100%	50%	100%	100%	100%	50%
	D. Representations	100%	100%	100%	100%	100%	100%
	Algebraic Reasoning Overall	**100%**	**88%**	**100%**	**100%**	**100%**	**88%**
Geometric Reasoning	A. Figures and their properties	100%	100%	100%	100%	100%	100%
	B. Transformations and symmetry	0%	66%	33%	33%	100%	33%

Key Content	Organizing Component	Percent of Mathematics Performance Expectations Assessed By At Least One Test Item					
		A	B	C	D	E	F
	C. Connections between geometry and other mathematical content strands	66%	66%	66%	66%	100%	66%
	D. Logic and reasoning in geometry	0%	100%	100%	100%	100%	100%
	Geometric Reasoning Overall	**42%**	**83%**	**75%**	**75%**	**100%**	**75%**
Measurement Reasoning	A. Measurement involving physical and natural attributes	100%	0%	66%	100%	100%	100%
	B. Systems of measurement	0%	50%	100%	100%	100%	100%
	C. Measurement involving geometry and algebra	66%	66%	67%	100%	100%	100%
	D. Measurement involving statistics and probability	0%	0%	0%	0%	50%	50%
	Measurement Reasoning Overall	**42%**	**29%**	**58%**	**75%**	**88%**	**88%**
Probabilistic Reasoning	A. Counting principles	0%	0%	100%	100%	100%	0%
	B. Computation and interpretation of probabilities	0%	0%	0%	50%	100%	0%
	Probabilistic Reasoning Overall	**0%**	**0%**	**50%**	**75%**	**100%**	**0%**
Statistical Reasoning	A. Data collection	0%	0%	0%	0%	0%	0%
	B. Describe data	0%	25%	50%	75%	75%	100%
	C. Read, analyze, interpret, and draw conclusions from data	0%	0%	50%	50%	100%	100%
	Statistical Reasoning Overall	**0%**	**13%**	**33%**	**42%**	**58%**	**67%**
Functions	A. Recognition and representation of functions	50%	0%	50%	100%	50%	50%
	B. Analysis of functions	100%	100%	100%	100%	100%	100%
	C. Model real world situations with functions	50%	100%	100%	100%	100%	
	Functions Overall	**67%**	**67%**	**83%**	**100%**	**83%**	**75%**
Problem Solving and Reasoning	A. Mathematical problem solving	80%	80%	80%	100%	80%	80%
	B. Logical reasoning	0%	50%	100%	100%	100%	100%
	C. Real world problem solving	33%	100%	33%	100%	100%	100%
	Problem Solving and reasoning Overall	**38%**	**77%**	**71%**	**100%**	**93%**	**93%**

Key Content	Organizing Component	Percent of Mathematics Performance Expectations Assessed By At Least One Test Item					
		A	B	C	D	E	F
Communication and Representation	A. Language, terms, and symbols of mathematics	66%	100%	100%	100%	100%	100%
	B. Interpretation of mathematical work	50%	100%	50%	100%	100%	100%
	C. Presentation and representation of mathematical work	0%	0%	33%	33%	33%	100%
	Communications and Representations Overall	**39%**	**67%**	**61%**	**78%**	**78%**	**100%**
Connections	A. Connections among the strands of mathematics	50%	100%	50%	100%	50%	100%
	B. Connections of mathematics to nature, real-world situations, and everyday life	33%	66%	33%	33%	33%	100%
	Connections Overall	**42%**	**83%**	**42%**	**67%**	**42%**	**100%**
Key Cognitive Strategies	A. Intellectual curiosity	0%	0%	50%	**0%**	**0%**	**0%**
	B. Reasoning	0%	0%	**0%**	25%	**0%**	25%
	C. Problem solving	66%	66%	67%	67%	67%	100%
	D. Academic behaviors	0%	0%	0%	0%	25%	0%
	E. Work habits	0%	0%	0%	0%	0%	0%
	F. Academic integrity	0%	0%	0%	0%	0%	0%
	Key Cognitive Strategies Overall	**11%**	**11%**	**20%**	**15%**	**15%**	**21%**
Foundational Skills	A. Reading across the curriculum	12%	12%	38%	25%	25%	25%
	B. Writing across the curriculum	0%	0%	0%	0%	0%	0%
	C. Research across the curriculum	0%	0%	0%	0%	0%	0%
	D. Use of data	0%	0%	0%	0%	33%	100%
	E. Technology	0%	0%	0%	0%	0%	0%
	Foundational Skills Overall	**2%**	**2%**	**8%**	**5%**	**12%**	**25%**
Overall	**Total**	**39%**	**50%**	**58%**	**69%**	**72%**	**68%**

Note: Percents were computed using the total number of matches (if different reviewers identified the same item as assessing a performance expectation, that item counted each time it was identified). Shaded cells indicate the recommended benchmark of 50 percent was met.

Using the criteria that a test have at least one item assessing each performance expectation, all the tests sufficiently assess numeric reasoning, algebraic reasoning, geometric reasoning, measurement reasoning, functions, problem solving and

reasoning, and communication and representation.

Less well covered are the cross-disciplinary skills. None of the tests sufficiently assess this, although all tests do asses the problem solving component of the key cognitive strategies, and a single test assesses the use-of-data component of the foundational skills and has the best overall assessment of foundational skills.

The ELA content is less consistently assessed by the tests than the mathematics content. Table 22 describes the range of knowledge for the ELA. On average, across all key content, the tests covered between 34 to 62 percent of the content described by the CCRS.

Table 22. Range of Knowledge (using total number of matches) by ELA Test

Key Content	Organizing Component	Percent of ELA Performance Expectations Assessed by at Least One Test Item					
		A	B	C	D	E	F
Writing	A. Compose a variety of texts that demonstrate clear focus, the logical development of ideas in well-organized paragraphs, and the use of appropriate language that advances the author's purpose.	100%	100%	100%	100%	100%	100%
	Writing Overall	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Reading	A. Locate explicit textual information and draw complex inferences, analyze, and evaluate the information within and across texts of varying lengths.	73%	73%	55%	45%	64%	64%
	B. Understand new vocabulary and concepts and use them accurately in reading, speaking, and writing.	0%	33%	33%	33%	33%	33%
	C. Describe, analyze, and evaluate information within and across literary and other texts from a variety of cultures and historical periods.	0%	50%	25%	0%	0%	0%
	D. Explain how literary and other texts evoke personal experience and reveal character in particular historical circumstances.	0%	50%	0%	0%	0%	0%
	Reading Overall	**18%**	**52%**	**28%**	**20%**	**24%**	**24%**
Research	A. Formulate topic and questions.	0	0	0	0	0	0

Key Content	Organizing Component	Percent of ELA Performance Expectations Assessed by at Least One Test Item					
		A	B	C	D	E	F
	B. Select information from a variety of sources.	0%	0%	0%	0%	75%	0%
	Research Overall	**0%**	**0%**	**0%**	**0%**	**38%**	**0%**
Key Cognitive Strategies	A. Intellectual curiosity	0%	0%	0%	100%	100%	0%
	B. Reasoning	100%	75%	25%	100%	100%	75%
	C. Problem solving	67%	33%	33%	100%	67%	33%
	D. Academic behaviors	25%	25%	25%	100%	50%	25%
	E. Work habits	0%	0%	0%	100%	0%	0%
	F. Academic integrity	25%	0%	0%	100%	50%	25%
	Key Cognitive Strategies Overall	**36%**	**22%**	**14%**	**100%**	**61%**	**26%**
Foundational Skills	A. Reading across the curriculum	63%	88%	75%	75%	75%	75%
	B. Writing across the curriculum	67%	100%	67%	100%	100%	67%
	C. Research across the curriculum	0%	0%	0%	100%	0%	0%
	D. Use of data	0%	0%	0%	100%	0%	33%
	E. Technology	0%	0%	0%	75%	0%	0%
	Foundational Skills Overall	**26%**	**38%**	**28%**	**90%**	**35%**	**35%**
Overall	**Total**	**36%**	**42%**	**34%**	**62%**	**52%**	**37%**

Note: Percents were computed using the total number of matches (so that if different reviewers identified the same item as assessing a performance expectation, that item counted each time it was identified). Shaded cells in the table indicate the recommended benchmark of 50 percent was met.

While categorical concurrence identifies the tests that have enough items to reliably assess individual performance expectations, range of knowledge identifies the tests that assess the most performance expectations. Using the criteria that tests have at least one item assessing each performance expectation, all tests sufficiently assess writing only. Reading and the cross-disciplinary skills are less well covered by the tests. As with mathematics, the organizing components high in the range of knowledge tended to be high across all tests, regardless of the number of items. When these components were low, they tended to be low across all tests.

Interpretation of Findings

Results suggest that most of the admissions and placement tests reviewed align to a moderate to high level with the CCRS performance expectations in mathematics and

ELA. None of the tests aligns at a high level with the cross-disciplinary skills. The tests exhibited similar results for categorical-concurrence and range-of-knowledge measures.

In mathematics, alignment (as measured by both categorical concurrence and range of knowledge) is highest for numeric reasoning, algebraic reasoning, functions, problem solving and reasoning, and communications and representations; lower for connections, geometric reasoning, measurement reasoning, and statistical reasoning; and lowest for foundational skills, probabilistic reasoning, and key cognitive strategies. These findings are consistent with the tests specifications. All of the tests are designed to assess numeric reasoning, algebraic reasoning, geometric reasoning, and functions; only one-third are designed to assess measurement reasoning, probabilistic reasoning, statistical reasoning, and problem solving reasoning; and none of the tests specify the connections content that are in the CCRS.

In ELA, alignment (as measured by categorical concurrence and range of knowledge) is highest for writing, lower for reading and foundational skills, and lowest for key cognitive strategies. Although minimally assessed by one test, none of the tests provide sufficient assessment of the research performance expectations contained in the CCRS. These findings are somewhat unexpected because all ELA tests are designed to assess reading and writing, yet only writing shows consistent and sufficient alignment.

Rater agreement was higher for mathematics items and standards than for ELA items and standards, suggesting perhaps that college readiness standards are still a new phenomenon for reviewers and that special attention needs to be paid to developing stronger common mental maps of the standards on the part of all reviewers before they begin rating test items. Reviewer agreement was higher for cognitive-demand ratings than for rigor ratings, which is counterintuitive as rigor is rated on a smaller scale (1–3 rather than 1–4) and evaluating whether an item or a standard is at the level of an entry-level college student might appear to be a more straightforward distinction to make than determining the thought process required by an item or standard. Other researchers

report similar findings (Herman, Webb, Zuniga, 2005), suggesting that it may be easier to apply cognitive-demand ratings consistently than it is to apply rigor ratings consistently. While an agreement of 0.8 or higher is ideal, other studies in this area have yielded typical agreement measures for alignment studies closer to 0.5 (Blank, 2007), a criterion level that this study exceeds.

Analysis of the rigor and cognitive-demand ratings shows similar patterns for both measures. For the CCRS subject areas, the ELA performance expectations are more rigorous and cognitively demanding than are the cross-disciplinary skills and the mathematics standards. The mathematics standards are the least rigorous, averaging below the level at which an entry-level college student should be expected to perform. The ELA standards are the highest and averaged close to the level at which entry-level college students should be expected to perform. The cross-disciplinary skills fall between mathematics and ELA.

The most rigorous and cognitively demanding mathematics concepts involve statistical and logical reasoning. Although statistics is increasingly taught in high school, its concepts may be more abstract than typical high school mathematics content. Logical reasoning is a complex skill that is difficult to assess with multiple-choice items. The CCRS are more rigorous and cognitively demanding than the test items in this area. This should not be unexpected because the CCRS describe the knowledge and skills that college-ready students should have, while the test items assess a much broader range of proficiency in order to determine the level necessary to enter a credit-bearing course.

Some CCRS are not assessed by any items on any test. For mathematics, these include skills that may not be assessable by multiple-choice test items, including practical mathematics skills (planning a study, collecting data, analyzing relationships between paired data, recognizing reliability of statistical results). For ELA, these include practical reading skills (using reference guides to confirm the meanings of new words or

concepts, reading a variety of texts from world literatures, etc.) and practical research skills (formulating a research question, exploring a research topic, using source material ethically, etc.) and include skills not practical in a typical standardized testing environment, even with the use of constructed-response type items.

The lack of coverage for these standards suggests that to assess the full range of knowledge and skills necessary to be college ready in the state of Texas may eventually require additional methods. Previous research supports this, suggesting that item type is an important factor in determining what *assessable* content is (Rothman, 2004), and that using multiple methods, including performance assessment and constructed response-type items in more subjects than writing, may be necessary to cover fully content that is not assessable through multiple-choice items. It may be worth considering combining multiple-choice test results with end-of-course-exam results, senior demonstrations or projects, performance assessments, or portfolios in order to gauge student readiness across the full set of college and career standards.

Additional work may be needed to standardize the methodology for including test pools in alignment studies. As noted earlier, previous researchers using both test forms and item pools in an alignment study have tended not to address explicitly the likely impact on findings resulting from the different number of items. Although similar results were found across test pools and forms, metrics that rely upon counts may not always be directly comparable. Future research should be conducted to refine methods for direct comparisons of test forms to test-item banks.

Finally, based on this study, the recommendation is to consider the development and introduction of measures and assessments that are based on broader and more robust conceptions of college readiness that are consistent with the full set of Texas College and Career Readiness Standards and a fuller set of college readiness expectations. Such an approach would help lead the nation in a direction in which college readiness became the expression of a full range of skills and capabilities, some of which can be

measured by current commercially available instruments and others that will require new tools and methods. Such a system would be able to provide the full range of information that is necessary to know if students are truly college ready and to identify and diagnose the specific areas where students need additional help, practice, support, and skill building to be prepared to succeed in entry-level college courses.

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Appendix A: Texas College and Career Readiness Cross-Disciplinary Standards

The following cross-disciplinary standards are excerpted from the Texas College and Career Readiness Standards (CCRS). To view all CCRS, including the English/language arts, mathematics, science, and social standards, please go to: http://www.thecb.state.tx.us/collegereadiness/TCRS.cfm

The cross-disciplinary standards are organized into two major areas: Key Cognitive Skills and Foundational Skills. The Key Cognitive Skills specify intellectual behaviors that are prevalent in entry-level college courses. The list includes intellectual curiosity, reasoning, problem solving, academic behaviors, work habits, and academic integrity. Foundational Skills consist of proficiencies students need to be able to transfer knowledge and apply it across the curriculum. These include reading, writing, conducting research, understanding and using data, and using technology.

The first three levels of the cross-disciplinary standards are written to apply across subject areas. The performance indicators found in the appendix illustrate how the cross-disciplinary standards are manifested within the subject areas. The Vertical Teams created an example in each subject area of at least one performance indicator that could be applied in that subject area. These indicators are meant to exemplify how the cross-disciplinary standards could be demonstrated in all subject areas.

I. Key Cognitive Skills

A. Intellectual curiosity

1. **Engage in scholarly inquiry and dialogue.**
   a. Identify what is known, not known, and what one wants to know in a problem.
   b. Conduct investigations and observations.
   c. Cite examples or illustrations in which a clear-cut answer cannot be reached.
2. **Accept constructive criticism and revise personal views when valid evidence warrants.**
   a. Articulate a point of view and provide valid evidence to support findings.
   b. Demonstrate willingness to take intellectual risks by investigating novel, controversial, or unpopular opinions or conclusions.
   c. Examine alternative points of view, taking different roles to defend, oppose, and remain neutral on issues.
   d. Recognize conflicting information or unexplained phenomena.

B. Reasoning

1. **Consider arguments and conclusions of self and others.**
   a. Know and apply logic to analyze patterns and descriptions and to evaluate conclusions.
   b. Cite valid examples or illustrations that support the conclusions.
   c. Question whether the claims and conclusions of self and others are supported by evidence.
   d. Identify counter examples to disprove a conclusion.
2. **Construct well-reasoned arguments to explain phenomena, validate conjectures, or support positions.**
   a. Participate in a debate that is based on facts and has a logical structure.
   b. Construct a visual presentation, including hypothesis, data, results, and conclusion.
   c. Write a paper that addresses counter-arguments to advocated positions.
   d. Recognize and apply techniques of statistical or probabilistic analysis to judge reliability of information.
   e. Organize an argument separating fact from opinion.
3. **Gather evidence to support arguments, findings, or lines of reasoning.**
   a. Use different kinds of data (e.g., case studies, statistics, surveys, documents) to support an argument.
   b. Evaluate evidence in terms of quality and quantity.
   c. Describe limitations of data collection methods.
4. **Support or modify claims based on the results of an inquiry.**
   a. Refine claims and adjust a position in response to inquiry.
   b. Review and check strategies and calculations, using alternative approaches when possible.

C. Problem solving

1. **Analyze a situation to identify a problem to be solved.**
   a. Represent and/or restate the problem in one or more ways (e.g., graph, table, equation), showing recognition of important details and significant parameters.
   b. Break complex problems into component parts that can be analyzed and solved separately.
   c. Apply previously learned knowledge to new situations.
   d. Analyze a media report, identify any misuse of statistics, and suggest ways to more accurately depict this information.
2. **Develop and apply multiple strategies to solve a problem.**
   a. Use a range of standard methods, devices, techniques, and strategies to gather and analyze information.
   b. Use knowledge gained from other subject areas to solve a given problem.
3. **Collect evidence and data systematically and directly relate to solving a problem.**

a. Use general and specialized reference works and databases to locate sources.
b. Collect evidence and data directly related to solving the problem and eliminate irrelevant information.
c. Produce charts, graphs, and diagrams accurately, including scale, labeling, units, and organization.
d. Present the collected data visually, describe the data collection procedure, and defend choosing that procedure over other possibilities.

D. Academic behaviors

1. **Self-monitor learning needs and seek assistance when needed.**
   a. Ask questions to check for understanding or to clarify information.
   b. Use a systematic method for recording, storing, and organizing materials and resources; avoid haphazard or messy accumulation of information.
2. **Use study habits necessary to manage academic pursuits and requirements.**
   a. Manage time effectively to complete tasks on time.
   b. Demonstrate accurate note-taking.
   c. Use the appropriate level of detail necessary to complete an assigned task.
   d. Balance academic and non-academic activities to successfully participate in both.
3. **Strive for accuracy and precision.**
   a. Collect and report experimental data carefully and correctly.
   b. Produce charts, graphs, and diagrams accurately, including scale, labeling, units, and organization.
   c. Eliminate irrelevant information from an assignment.
4. **Persevere to complete and master tasks.**
   a. Persevere until a task is completed by working even when faced with uncertainty or open-ended assignments.
   b. Seek assistance when needed to complete the assignment.
   c. Recognize when a task is completed.

E. Work habits

1. **Work independently.**
   a. Plan a project, establish its parameters, and complete it with minimal supervision, seeking assistance accordingly.
   b. Follow directions or procedures independently.
   c. Complete assignments outside the classroom setting in a timely manner.
2. **Work collaboratively.**
   a. Work collaboratively with students from various cultural and ethnic backgrounds.
   b. Distinguish between situations where collaborative work is appropriate and where it is not.

c. Work in small groups to investigate a problem or conduct an experiment.

F. Academic integrity

1. **Attribute ideas and information to source materials and people.**
   a. Document the work of others, giving credit where credit is due and never claim credit for work that is not one's own.
   b. Use standard bibliographic and reference citation formats, choosing the style appropriate to the subject and the audience.
   c. Define plagiarism and articulate the consequences of academic dishonesty.
2. **Evaluate sources for quality of content, validity, credibility, and relevance.**
   a. Verify validity of a source within a submitted work.
   b. Compare and contrast coverage of a single topic from multiple media sources.
3. **Include the ideas of others and the complexities of the debate, issue, or problem.**
   a. Present multiple perspectives of an issue.
   b. Represent accurately the data, conclusions, or opinions of others.
4. **Understand and adhere to ethical codes of conduct.**
   a. Follow copyright laws and restrictions.
   b. Use technology responsibly (e.g., avoiding malice, misrepresentation, or misleading use of information).

II. Foundational Skills

A. Reading across the curriculum

1. **Use effective prereading strategies.**
   a. Use the title, knowledge of the author, and place of publication to make predictions about a text.
   b. Use a table of contents to preview a text and understand its design.
   c. Scan headline sections or other division markers, graphics, or sidebars to form an overview of a text.
2. **Use a variety of strategies to understand the meanings of new words.**
   a. Use context clues, including definitions, examples, comparison, contrast, cause and effect, and details provided in surrounding text.
   b. Consult references (e.g., dictionary, thesaurus) effectively.
   c. Understand notation specific to discipline (e.g., mathematical notation, scientific symbols).
3. **Identify the intended purpose and audience of the text.**
   a. Predict purpose and audience of a text based on the title, preface, and other features of a text.
   b. Explain how the language of an effective text targets an intended audience.
   c. Explain the importance of a technical and/or scientific article.

4. **Identify the key information and supporting details.**
   a. Outline a chapter of an informational text.
   b. Summarize the major points in a text, and use graphic organizers (e.g., concept maps, diagrams) to organize ideas and concepts in a visual manner.
   c. Analyze connections between major and minor ideas.
   d. Identify and define key terminology from technical and/or scientific documents.
5. **Analyze textual information critically.**
   a. Identify faulty premises in an argument.
   b. Identify stated and implied assumptions.
   c. Identify conclusions unsupported by sufficient evidence in informational texts.
   d. Use inductive and deductive reasoning.
   e. Draw conclusions based on evidence, support, or data through logical reasoning.
   f. Compare a primary source and an interpretation in a textbook.
6. **Annotate, summarize, paraphrase, and outline texts when appropriate.**
   a. Outline an informational or literary text.
   b. Annotate text for comprehension and analysis.
   c. Summarize an article to demonstrate comprehension.
   d. Paraphrase a writer's ideas or findings.
7. **Adapt reading strategies according to structure of texts.**
   a. Identify a variety of textual forms and genres (e.g., long and short texts) and adapt reading strategies accordingly.
   b. List strategies to use during reading, including:
      - Anticipate and predict what information the text is likely to contain.
      - Monitor understanding by self-questioning.
      - Use strategies (e.g., mental imagery, paraphrasing, information in glossaries) to re-examine the text if comprehension fails.
      - Reread difficult passages.
      - Read ahead for additional clarification.
      - Seek assistance for clarification.
      - Self-monitor and summarize the information gained.
   c. Explain how form or genre communicates meaning.
8. **Connect reading to historical and current events and personal interest.**
   a. Locate an article or source that relates to a class topic and explain the relevance.

B. Writing across the curriculum

1. **Write clearly and coherently using standard writing conventions.**
   a. Prepare a topic proposal that specifies a purpose and justifies the choice of audience to achieve that purpose.

b. Craft a thesis statement that articulates a position and list relevant evidence and examples in logical groupings.
c. Use symbols, diagrams, graphs, and words to communicate ideas.
d. Use appropriate terminology and data expression to communicate information in a concise manner.
e. Use a variety of reference guides for citation conventions, grammar, mechanics, and punctuation.

2. **Write in a variety of forms for various audiences and purposes.**
   a. Present an argument supported by relevant evidence, examples, and counterarguments.
   b. Prepare a summary or abstract of a journal article or report, extracting in brief form the pertinent information.
   c. Evaluate articles by analyzing the study design, data source, graphical representation of data, and analyzed data results reported (or not reported).
   d. Write a reflection about the process selected to conduct research or solve a problem.
   e. Write accurate and understandable lab reports and technical documents.
3. **Compose and revise drafts.**
   a. Submit a writing assignment to be proofread by a teacher, parent, or other student. Revise the paper, incorporating constructive criticism when appropriate.
   b. Edit text for correct spelling, capitalization, and punctuation.
   c. Edit for appropriate tense and voice.
   d. Edit for correct word use.
   e. Use a variety of reference guides for citation conventions, grammar, mechanics, and punctuation.
   f. Submit a final draft that is easily read and has few or no grammatical or spelling errors.

C. Research across the curriculum

1. **Understand which topics or questions are to be investigated.**
   a. Formulate research questions.
   b. Use strategies like those in the writing process to generate questions and areas to pursue.
   c. Consult previous studies or conduct interviews with experts to identify questions central to a research topic.
   d. Propose explicit, testable hypotheses, using the “if ..., then ...” format.
2. **Explore a research topic.**
   a. Produce an annotated list of sources consulted, differentiating among primary, secondary, and other sources and explain their relevance to the research topic.
   b. Outline the most significant controversies or questions on a research topic.
   c. Plan an investigative study.

d. Explain reasons for valid competing points of view on a given topic.

3. **Refine research topic based on preliminary research and devise a timeline for completing work.**
   a. Gather information from a variety of relevant sources.
   b. Use general and specialized reference works and databases to locate sources.
   c. Locate electronic sources, when appropriate, using advanced search strategies.
   d. Select an appropriate range of source materials.
   e. Analyze a wide range of sources, including technical texts, primary and secondary sources, conflicting points of view, and interdisciplinary research when appropriate.
   f. Design and carry out hands-on experimental investigations, choosing appropriate apparatuses, identifying controls and variables, tentatively predicting the outcome of the procedures, and evaluating whether actual results agree with predicted results.
   g. Use numerical and mathematical tools such as software, including databases, spreadsheets, and other tools, in investigations and explanations.
4. **Evaluate the validity and reliability of sources.**
   a. State explicitly characteristics or identifying features that indicate accuracy or reliability of sources, to determine whether sources are biased, incomplete, or otherwise unreliable.
   b. Follow a set of criteria to determine the validity and reliability of sources.
   c. Identify claims found in one or more of the sources that require support or verification, and evaluate the information's validity.
   d. Evaluate the data presented in graphics, tables, charts, and maps when appropriate to the topic.
5. **Synthesize and organize information effectively.**
   a. Select quotations and evidence that support the thesis.
   b. Determine what evidence best supports conclusions.
   c. Use well-organized strategies to collect and organize information gathered.
   d. Determine the best order for presenting evidence that supports conclusions.
6. **Design and present an effective product.**
   a. Determine the best order for presenting major and minor points.
   b. Design a report using features such as headings and graphics appropriate to the writing task.
   c. Use a citation system specified by or appropriate to the assignment.
7. **Integrate source material.**
   a. Integrate source material into text by a combination of accurately summarizing, paraphrasing, and quoting.
   b. Balance use of source material with relevant explanations.
   c. Use source material ethically.

d. Understand and avoid all types of plagiarism.

8. **Present final product.**
   a. Use appropriate media for presentation of research results.
   b. Document sources using a standard format appropriate to the subject area.

D. Use of data

1. **Identify patterns or departures from patterns among data.**
   a. Identify patterns from multiple representations of data such as graphical and tabular forms.
   b. Review current news events and evaluate possible connections (e.g., linking economic data with political events).
2. **Use statistical and probabilistic skills necessary for planning an investigation and collecting, analyzing, and interpreting data.**
   a. Create representations of data (e.g., data tables, correctly labeled and scaled graphs, narrative descriptions).
   b. Evaluate a given published report for missing information and misuse of data.
3. **Present analyzed data and communicate findings in a variety of formats.**
   a. Compose a written document detailing a research project.
   b. Use appropriate visuals and statistical results to convey findings to a specified audience.

E. Technology

1. **Use technology to gather information.**
   a. Use the Internet or other appropriate technologies to post survey questions on an assigned topic.
   b. Use devices to measure physical properties.
   c. Use online databases to access scholarly work on an assigned research topic.
2. **Use technology to organize, manage, and analyze information.**
   a. Use data analysis software to analyze survey results.
   b. Use spreadsheets to manage and organize statistical data.
3. **Use technology to communicate and display findings in a clear and coherent manner.**
   a. Create spreadsheets and graphs to communicate findings in a presentation that includes graphics, visuals, or other supporting images.
   b. Utilize technology to present information and/or data in a variety of ways.
4. **Use technology appropriately.**
   a. Explain how technology is a useful and effective tool to communicate findings.
   b. Identify when technology may not be necessary or appropriate to communicate findings.
   c. Formulate strategies to communicate findings with and without technology.

Appendix B: Scale Items & Rationale Statements for Examining the Alignment between the Texas College and Career Readiness Standards and Entry-Level College Courses at Texas Postsecondary Institutions

Most Necessary for Preparation to Succeed in this Course

- This element is critical for success in the course
- Course is taught with the assumption that students already know this information
- This element will not be retaught in this course
- Students will have difficulty succeeding in the course if they have not learned this element previously
- Other – provide reason

More Necessary for Preparation to Succeed in this Course

- This element is important for success in the course
- Course is taught with the assumption that students are at least familiar with or aware of this element
- This element will be reviewed only and not retaught in this course
- Students will benefit from having learned this element previous to the course but can probably relearn it during the course and still succeed in the course
- Other – provide reason

Less Necessary for Preparation to Succeed in this Course

- Student knowledge of and familiarity with this element may be helpful
- Course is taught with the assumption that students are familiar with the element on a very general level
- This element will be taught in some detail in the class
- Even if students have not learned this previously, they will be able to learn it in the course at a level sufficient to succeed in the course
- Other – provide reason

Least Necessary for Preparation to Succeed in this Course

- Students need only minimal knowledge of and familiarity with this element
- Course is taught with the assumption that students may be only vaguely aware of the element
- This element will be taught as new material in this course even if students have been taught it before
- Students will be able to succeed in this course even if they only have a very general awareness or understanding of this element when they enter the course
- Other – provide reason

Not Necessary for Preparation to Succeed in this Course

- This element is too advanced for this course
- This element will be encountered for the first time in subsequent courses in the subject area
- This element is too specialized or specific for this course
- This element is irrelevant to this course
- This element will be introduced as new material in this course with the assumption that students have not learned anything about it before this course
- Other – provide reason

Appendix C: Reference Course Profile: English Composition II

ENGL 1302
Principles and techniques of written, expository, and persuasive composition; analysis of literary, expository, and persuasive texts; and critical thinking.*

Reference Course Profile: Overview and Purpose

A Reference Course Profile represents **current** practice in entry-level college courses in Texas. Twenty-six course profiles were developed from an extensive study of over 900 entry-level general education and CTE college courses offered at Texas institutions of higher education. Each course profile consists of a course description, sample syllabus, reference lists, attendant course materials (such as assignments, assessments, and, in some cases, scoring rubrics), and the Texas College and Career Readiness Standards addressed within the course.

The Profiles provide a reference point for college readiness that fosters increased transparency between secondary and postsecondary education. **They are not intended to be mandatory, prescriptive, or best practice.**

Prerequisites and Prior Knowledge

Most college-level syllabi do not list all prior knowledge required to succeed in the course; it is usually an underlying assumption. For the purpose of this Reference Course Profile, the required prior knowledge and skills students need to be successful in the course are explicitly stated to help both secondary and postsecondary faculty in establishing goals and expectations for their students. The knowledge and skills reflected in the outline in this section are pulled directly from the Texas College and Career Readiness Standards (CCRS), written and validated by Texas faculty in 2007-8. The CCRS are available online at: http://www.thecb.state.tx.us/collegereadiness/CRS.pdf

Prior to enrolling in this course, students must

- Satisfy Texas Success Initiative (TSI) requirements set by the institution as described in Coordinating Board rule (Texas Administrative Code, Chapter 4, Subchapter C).
- ENGL 1301 or its equivalent.

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* *From the course description appearing in the Lower Division Academic Course Guide Manual (ACGM) http://www.thecb.state.tx.us/AAR/UndergraduateEd/WorkforceEd/acgm.htm*

In addition, students should have the following College and Career Readiness Standards skills. Only the specific standards and performance expectations pertinent to the course are listed on the following pages.

English/Language Arts College and Career Readiness Standards

- **I. Writing**
  - B. Compose a variety of texts that demonstrate clear focus, the logical development of ideas in well-organized paragraphs, and the use of appropriate language that advances the author's purpose.
- **II. Reading**
  - A. Locate explicit textual information, draw complex inferences, and analyze and evaluate the information within and across texts of varying lengths.
  - B. Understand new vocabulary and concepts and use them accurately in reading, speaking, and writing.
- **III. Speaking**
  - A. Understand the elements of communication both in informal group discussion and formal presentations.
  - B. Develop effective speaking styles for both group and one-on-one situations.
- **IV. Listening**
  - A. Apply listening skills as an individual and as a member of a group in a variety of settings.
  - B. Listen effectively in informal and formal situations.
- **V. Research**
  - A. Formulate topic and questions.
  - B. Select information from a variety of sources.

Cross-Disciplinary Standards

- **I. Key Cognitive Skills**
  - A. Intellectual Curiosity
  - B. Reasoning
  - C. Problem Solving
  - D. Academic Behaviors
  - E. Work Habits
  - F. Academic Integrity
- **II. Foundational Skills**
  - A. Reading Across the Curriculum
  - B. Writing Across the Curriculum
  - C. Research Across the Curriculum
  - D. Use of Data
  - E. Technology

Course Objectives

Course objectives include the course-specific skills and knowledge that students will possess upon completion of the course. They assist postsecondary faculty in clarifying the goals of their courses and provide a clear picture of the expectations students will encounter once they begin college. This sample list of objectives was adapted from syllabi submitted in 2008 by Texas college faculty.

Upon completion of the course the student will be able to:

1. Demonstrate critical thinking skills as evidenced by the ability to analyze facts, synthesize factual information, and evaluate opinions in light of the facts presented throughout this course.
2. Demonstrate the ability to recognize and use both deductive and inductive logic and to recognize logical fallacies in one's own writing and in the writing of others.
3. Write a well-developed, coherent essay with a minimum of grammatical errors.
4. Utilize library resources effectively.
5. Document sources clearly while supporting a thesis with both primary and secondary sources.
6. Demonstrate revising and editing skills.
7. Demonstrate effective speaking skills.

Research Objectives:

This course is a "research" course, which means that it intends to help students grapple with the notion of scholarly inquiry. That is, what is research for? What are its objectives? What are its methods? What are its shortcomings? Students should learn to appreciate research as a highly social matter: that real research must make some kind of contribution to the understanding of people besides just the researcher.

Critical thinking is an important objective of this course. Critical thinking is a process involving higher order thinking skills. These skills include, but are not limited to, application, analysis, synthesis, and evaluation of factual information.

A well-cultivated critical thinker[3]:

- Raises vital questions and problems, formulating them clearly and precisely.
- Gathers and assesses relevant information, using abstract ideas to interpret it effectively.
- Comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards.
- Thinks open-mindedly within alternative systems of thought, recognizing and assessing their assumptions, implications, and practical consequences.
- Communicates effectively with others in finding solutions to complex problems.

[3] *Paul, Richard & Elder, Linda.* The Miniature Guide to Critical Thinking Concepts & Tools. *Dillon Beach: The Foundation for Critical Thinking, 2005.*

Reading Objectives:
Reading at the college level means having the ability to analyze and interpret a variety of printed materials: books, articles, and documents.

Speaking Objectives:
Effective speaking is the ability to communicate orally in clear, coherent, and persuasive language appropriate to purpose, occasion, and audience.

Computer Literacy Objectives:
Computer literacy at the college level means having the ability to use computer-based technology in communicating, solving problems, and acquiring information. Core-educated students should have an understanding of the limits, problems, and possibilities associated with the use of technology and should have the tools necessary to evaluate and learn new technologies as they become available.

Sample Textbooks and Materials

This list is comprised of texts that appear on course syllabi submitted in 2008 by faculty teaching entry-level college courses most representative of current practice in Texas. This list is not exhaustive, prescriptive, or required.

- Gibaldi, Joseph. *MLA Handbook for Writers of Research Papers*. 6th Ed. Modern Language Association of America, 2003.
- Hacker, Diana. *A Writer's Reference*, 6th Ed. Boston: Bedford/St. Martins, 2007.
- Lunsford, Andrea A., John J. Ruszkiewicz, and Keith Walters. *Everything's an Argument* (with readings). 4th Ed. Boston: Bedford/St, Martins, 2007.
- Kennedy, X. J. and Dana Gioia. *Literature: An Introduction to Fiction, Poetry, and Drama.* 10th Ed. New York: Longman, 2005.
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- A good college-level desk dictionary.

Sample Methods of Instruction

Students should be prepared to encounter a variety of instructional methods, as faculty indicate the use of several beyond the lecture format. The list of methods of instruction has been adapted from course syllabi submitted in 2008 by faculty teaching entry-level college courses most representative of current practice in Texas. The approximate percentage of time allocated to each instructional method is also indicated.

1. Lecture – 20%
   a. Lecture is defined as a method of instruction in which the instructor has full responsibility for presenting material orally.
   b. Lectures will take place in the form of informal lectures, in which active student participation, such as questioning and answering, will be included.
2. Full-class Discussion of Readings and Rhetorical Ideas – 30%
   a. Students will be expected to come to class ready to contribute to class discussion.
   b. Students will be expected to listen and respond to each other's comments.
3. Group Discussion – 10%
   a. In addition to class discussion, students will be expected to take turns facilitating small group discussions both in and outside of class time.
4. Peer Review of Writing – 10–15%
   a. Students will be expected to review the work of classmates and provide and accept constructive feedback.
5. One-on-one Conferences with Instructor – 10–15%
   a. Conferencing with the instructor on an individual basis allows students to get critical feedback of work.
6. Library Work – 15%
   a. Students are expected to become familiar with library resources and research methods.

Sample Assignments and Assessments

A typical number of formal assignments for ENGL 1302 is four to eight essays. The course will also include quizzes, a final exam, and a number of other assignments. Below are the kinds of assignments that might be expected and their percentage of the final grade.

1. Writing Assignments – 55%
   a. Students will complete a series of assignment culminating in a final research paper
2. Oral Presentation of research – 5%
   a. Students will be required to give a brief oral presentation of their research in front of the class.
3. Final Exam – 20%

4. Daily Work – 10%
   a. Daily work will consist of small, in-class assignments, as well as a reading journal that students will turn in periodically.
5. Quizzes – 10%

Sample Schedule

Samplings of assignments and assessments have been provided in the Reference Course Profile materials. Bolded blue text indicates when a document is provided and a link to that document is available. The time allocated for students to complete the assignment is also indicated. The list of topics, as well as the overall pacing of the course, has been adapted from course syllabi submitted in 2008 by faculty teaching entry-level college courses most representative of current practice in Texas.

Week	Reading/Discussion Topics	Assignments & Assessments
1	Read Wood, Ch. 1 & 3 Read Brady pp. 59–60	***Assignment 1: Reading Journal***
2	Read Wood, Ch. 4. pp. 109–113	***Assignment 2: Summary Connect Paper*** (3–4 hours)
3	Read Wood, Ch. 5.	Turn in Reading Journal
4	Read "On Women's Right to Vote" Read Wood, "Writing an Annotated Bibliography" pp. 327–31	***Assignment 3: Research Proposal*** (2 hours)
5	Introduce Research Project	Turn in Reading Journal Quiz 1
6	Student/Instructor Conferences	***Assignment 4: Research Paper*** (5–6 hours)
7	Research Project Workshop	Turn in Reading Journal (30–60 minutes)
8	Research Presentations Wood, Ch. 6 Read Wood, Ch. 7	Assessment 1 ***Reader Response Rubric provided*** ***Assignment 5: Exploratory Essay*** (4–5 hours)
9	Read Wood, Ch. 8 Proofs and fallacies	Turn in Reading Journal Quiz 2
10	Read Wood pp. 339–48 on the writing process Read Wood, Ch. 13	***Assignment 6: Position Paper*** (7–8 hours) *or* ***Short Story Project*** (8–10 hours)

Week	Reading/Discussion Topics	Assignments & Assessments
11	Peer review workshop Read Wood, Ch. 9	Turn in Reading Journal Quiz 3
12	Discuss MLA citation	***Assignment 7: Issue Research Project*** (2 hours) *or* ***Fiction Paper*** (3 hours)
13	Review Wood, Ch. 9 Oral presentations	Turn in Reading Journal Assessment 2*:* ***Oral Presentations Rubric provided***
14	Argument Workshop	***Assignment 8: Documented Inquiry*** (5–6 hours)
15	Final Exam	

Sample Class Policies and Expectations

Students often enter college unaware of expectations regarding attendance, participation, behavior, grading, and academic integrity. Faculty frequently include detailed policies and expectations in their syllabi, making explicit to students the standards of successful participation. There are often institutional-level policies as well.

Attendance Policy

Regular attendance is required. School policy states that a student who is absent more than six hours of class may be viewed as administratively dropped from the course. Students who intend to withdraw from the course must do so by the official date or they will receive an "F" in the course. Please be aware that the state of Texas has begun to impose penalties on students who drop courses excessively. For example, if a student repeats the same course more than twice, that person will have to pay extra tuition. Beginning in Fall 2007, the Texas Legislature passed a law limiting students to no more than SIX total course withdrawals throughout their educational career in obtaining a certificate and/or degree.

Consideration for excused absences is at the instructor's discretion. Excused absences include official university activities, documented religious observance, illness with a physician's note, or a verifiable death in the family.

Expectations

Student Conduct

- Students are expected to attend class regularly and to complete reading and writing assignments on the day specified.
- No food, drink, or tobacco of any kind is permitted in the classroom.
- Cell phones and pagers must be turned off during class.
- Disruptive behavior will not be tolerated.

- Examples of disruptive behavior include, but are not limited, to talking while the instructor is lecturing, discussing non-course related issues during class assignment time, and using profane language.

Academic Behaviors

- Students are expected to have adequate time management skills.
- Students are expected to self-monitor their level of competence in the subject in order to be aware when improvement is needed.
- Students are expected to seek out resources for improvement in understanding of the subject, such as study groups and tutoring.
- Students are expected to practice efficient study and preparation skills outside of class.
- Students are expected to take clear, concise class notes.
- Students are expected to be able to collaborate and work in a team.
- Students are expected to be able accept critical feedback including critiques of submitted work.

Grading Policy

Failure to turn in any essay will result in failure of this course!

Grading Scale

- A (90–100) = excellent/performance beyond mastery
- B (80–89) = above average/beyond basic mastery
- C (70–79) = average mastery
- D (60–69) = below average
- F (0–59) = failure

Evaluation Method

- Essay #1 – 5%
- Essay #2 – 10%
- Essay #3 – 15%
- Essay #4 (Research essay) – 25%
- Oral Presentation of research – 5%
- Final Exam – 20%
- Daily Work – 10%
- Quizzes – 10%

Sample of a grading rubric for essay assignments:

Grading Sheet: Total points possible = 100

1. Does the title tell the reader what the essay is about, and does the essay open with sufficient background information that sets a context for the topic and explains the controversy surrounding the topic? *(0–10 points)*
2. Is the thesis clearly stated? *(0–3 points)*
3. Do the examples and details in the essay clearly and sufficiently support the thesis? Does each paragraph relate to the thesis, and does each paragraph have a clear focus or topic sentence? *(0–15 points)*
4. Does the writer acknowledge and refute opposing viewpoints? *(0–10 pts)*
5. Is the essay organized in an easy-to-follow and coherent fashion? *(0–5 points)*
6. Does the writer provide transition words when needed between sentences, and does the writer provide transitions between paragraphs? *(0–4 points)*
7. Is the wording clear, effective, and error free? Does the writer vary sentence structure, incorporate "vigorous" (active) verbs, and employ concrete, vivid language that evokes sensory images? Does the writer use a consistent point of view and verb tense?
   (0–10 points)
8. Does the writer wrap up the essay with a concluding paragraph that effectively ties together the main points of the essay? *(0–3 points)*
9. Does the writer use proper spelling, grammar, and punctuation? *(0–40 points)*

Total Points

Academic Integrity Policy

Plagiarism will not be tolerated; be advised we use plagiarism detection software. The following, directly from the College Handbook, defines and sets the penalties for plagiarism and/or cheating: All academic work, written or otherwise, submitted by a student to an instructor or other academic supervisor, is expected to be the result of the student's own thought, research, or self-expression. In cases in which students feel uncertain about a question of plagiarism, they are obliged to consult the instructor on the matter prior to submitting any work. When students submit work purported to be their own, but which in any way borrows ideas, organization, wording, or anything else from another source without appropriate acknowledgment, they are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be from a published article, chapter of a book, or a paper from a friend.

Plagiarism also includes the practice of employing or allowing another person to alter or revise the work submitted as one's own. Students must acknowledge all outside sources of information. Making simple changes while leaving intact the organization and thoughts of others is plagiaristic. Plagiarism does not, however, extend to those ideas that are so generally and freely circulated as to be part of the public domain. Cheating includes, but is not limited to, students wrongfully giving, taking, or presenting any information or material with the intent of aiding themselves or others with any academic

work. Within seven working days of finding a student guilty of cheating or plagiarism, an instructor may choose to do one or more of the following:

- Assign any grade to the paper or test involved and so notify the student in writing.
- Assign any grade for the course in which the offending paper or examination was submitted and so notify the student in writing.
- Recommend that the student be dropped from the course in which the offense occurred. Such a recommendation shall be made to the Division Chair.
- Chair shall so recommend to the Dean of Instructional Services and send copies to the instructor and the student.
- Recommend that the student be dropped from a program of a division. Such a recommendation shall be made to the Division Chair and to the Division Chair of the student's program (if different); if agreement occurs, the Division Chair shall so recommend to the Dean of Instructional Services and send copies to the instructor and the student.
- Recommend suspension or dismissal from the College. Such a recommendation shall be made to the Division Chair; if agreement occurs, the Division Chair shall so recommend to the Dean division and/or the chairperson of the division in which the student is enrolled in a program, to the instructor, and to the student. If the Dean concurs on a recommendation of suspension or expulsion from the College, the Dean shall take the necessary action.

Sample List of Student Resources

The following list is representative of the resources mentioned in 2008 entry-level college course syllabi in Texas. The resources listed are indicative of the expectation that post-secondary students take responsibility for their own learning. As often explicitly stated in course syllabi, students are expected to take advantage of these resources, and may even be required to do so.

- *Writing Center*
  The English department operates a free-of-charge Writing Center in building X. Students in English courses can receive in-depth help with writing problems from the Writing Center staff. Students who believe that they could benefit from concentrated, supervised work on some aspect of writing should attend the Writing Center more than once while working on their papers.

- *Student Success Programs*
  The College supports a variety of programs to help connect students with the University and foster academic success. These programs include learning assistance, developmental education, advising and mentoring, admissions and transition, and federally-funded programs. Students requiring assistance academically, personally, or socially should contact the Office of Student Success Programs at xxx-xxx-xxxx for more information and appropriate referrals.

- *Americans with Disabilities Act*
  The college is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 92-112 of The Rehabilitation Act of 1973 as amended. With the passage of federal legislation entitled Americans with Disabilities Act (ADA), pursuant to section 504 of the Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens. As a faculty member, instructors are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty of their need for accommodation and in providing authorized documentation through designated administrative channels. Information regarding specific diagnostic criteria and policies for obtaining academic accommodations can be found at www.abc.edu/disability. Also, students may visit the Office for Students with Disabilities in room X of building X or call (xxx) xxx-xxxx.

- *E-Culture Policy*
  This course has adopted the College email address as an official means of communication with students. Through the use of email, the instructor is able to provide students with relevant and timely information, designed to facilitate student success. In particular, important information concerning registration, financial aid, payment of bills, and graduation may be sent to students through email. All students are assigned an email account and information about activating and using it is available at www.abc.edu. New students (first semester at the college) are able to activate their email account 24 hours after registering for courses. There is no additional charge to students for using this account, and it remains active as long as a student is enrolled at the college. Students are responsible for checking their email regularly.

Supplementary Documents

The following list represents additional documents included within the Reference Course Profile, but not included in the Sample Schedule. These supplementary materials are intended to enhance both instruction and student learning, and may be used at instructors' discretion.

- Revisions Handout
- Using Quotations in a Literary Essay Handout
- Works Cited Handout
- Explanation of MLA Documentation Style Handout
- Peer Response Questions
- Bibliography Checklist

- Computer Lab Agenda
- Direct Quotes Explanation
- Scoring Rubric

Appendix D: Scale Items & Rationale Statements For Alignment Between the CCRS and Entry-Level CTE Courses

Most Necessary for Preparation to Succeed in this Course

- This element is critical for success in the course
- Course is taught with the assumption that students already know this information
- This element will not be retaught in this course
- Students will have difficulty succeeding in the course if they have not learned this element previously

More Necessary for Preparation to Succeed in this Course

- This element is important for success in the course
- Course is taught with the assumption that students are at least familiar with or aware of this element
- This element will be reviewed only and not retaught in this course
- Students will benefit from having learned this element previous to the course but can probably relearn it during the course and still succeed in the course

Less Necessary for Preparation to Succeed in this Course

- Student knowledge of and familiarity with this element may be helpful
- Course is taught with the assumption that students are familiar with this element on a very general level
- This element will be taught in some detail in the class
- Even if students have not learned this previously, they will be able to learn it in the course at a level sufficient to succeed in the course

Least Necessary for Preparation to Succeed in this Course

- Students need only minimal knowledge of and familiarity with this element
- Course is taught with the assumption that students may be only vaguely aware of this element
- This element will be taught as new material in this course even if students have been taught it before
- Students will be able to succeed in this course even if they only have a very general awareness or understanding of this element when they enter the course

Not Necessary for Preparation to Succeed in this Course

- This element is too advanced for this course
- This element will be encountered for the first time in subsequent courses in the subject area
- This element is too specialized or specific for this course
- This element is irrelevant to this course

- This element will be introduced as new material in this course with the assumption that students have not learned anything about it before this course