Review and Analysis of Definitions of 21st Century Skills, College Readiness, and Career/Postsecondary Readiness

Draft Final Report

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SCOPE AND PURPOSE

The Colorado Department of Education (CDE) requested that the Southwest Regional Comprehensive Center at WestEd conduct a series of distinct analyses related to the Colorado Model Content Standards. The Southwest Comprehensive Center (SWCC) obtained the assistance of the Assessment and Standards Development Services (ASDS) program at WestEd to perform the analyses, because of their specific expertise and experience in performing these types of analyses. The project consists of four tasks intended to provide state constituents with information that will inform the refinement of Colorado's Model Content Standards:

1. a review and analysis of major definitions related to 21st Century Skills, College Readiness, and Career/Postsecondary Readiness;
2. a state-by-state profile of how states articulate their standards across individual grades and grade spans;
3. a review and a gap analysis of the Model Content Standards; and
4. an evaluation of existing external reports on the Colorado standards.

This document addresses Task 1. It presents findings of a review of the most commonly used definitions that elucidate the preparation students need to succeed beyond high school, specifically:

- 21st Century Skills;
- College Readiness; and
- Career/Postsecondary Readiness.

Although there is a growing percentage of high school graduates enrolling in college (Green & Winters, 2005), research suggests that high school graduates are not adequately prepared to succeed in college or in the modern workforce (ACT, 2004 & 2006; Achieve, 2004; National High School Center, 2007, Partnership for 21st Century Skills, n.d.; among others). Additionally, the nature of what "adequate preparation" entails is unclear—no consensus exists among developers of these standards nor among their consumers (i.e., post-secondary institutions or employers). Definitions for 21st Century Skills, College Readiness, and Career/Postsecondary Readiness typically are used to describe the knowledge and skills necessary for adequate preparation for success; aspects of these definitions overlap, though significant differences often exist among them.

This report is intended to provide CDE with a review of the definitions of terms related to post-high school readiness (i.e., 21st Century Skills, College Readiness, and Career/Postsecondary Readiness) in order to inform its refinement of Colorado's Model Content Standards. Inclusion of a particular definition in this report does not imply endorsement of the definition. Rather, this report is intended to present as comprehensive a review of definitions as possible, in order to inform CDE's refinement of the state's Model Content Standards. Further, this analysis is based solely on documents available

from the organizations providing the definitions, and does not include secondary analyses, which would have been beyond the scope and timelines of this project.

This document is organized as follows:

- Methods;
- Definitions; and
- Considerations for Choosing among the Definitions.

Appendix A contains detailed summaries of each definition.

METHODS

This section describes the criteria and procedures WestEd used to complete the collection and review of definitions of 21st Century Skills, College Readiness, and Career/Postsecondary Readiness. WestEd researchers involved in this task have expertise in content standards review and development, curriculum and instruction, mathematics, English language arts, workplace readiness standards and assessments, educational research, and media education.

Identification of Documents and Definitions

WestEd researchers conducted a search for resources relevant to 21st Century Skills, College Readiness, and Career/Postsecondary Readiness from the following sources: organizations known for their work in 21st Century Skills, College Readiness, and/or Career/Postsecondary Readiness; reports and articles addressing the issue of readiness; and state department of education websites.

This search yielded 13 sources for definitions. In some cases, the definitions used an alternate wording for the readiness term, but these were included if analysts determined that they were addressing the questions of interest to CDE. The definitions are listed in Table 1 below.

Table 1. Readiness Definitions Selected for Review

Name	Specific Term
21st Century Skills	
Global Education (CCSSO – SCASS.21)	21st century skills
enGauge (NCREL & the Metiri Group)	21st century skills
Framework for 21st Century Learning (Partnership for 21st Century Skills)	21st century learning
21st Century Workforce Commission	21st century workforce
College Readiness	
ACT College Readiness Standards & Benchmarks (ACT)	college readiness & workforce readiness
College Board Standards for College Success (College Board)	college readiness
Toward a More Comprehensive Conception of College Readiness (Educational Policy Improvement Center [EPIC])	college readiness
Pathways to College Network	college readiness
Understanding University Success (Standards for Success—Association of American Universities & The Pew Charitable Trusts)	college readiness
Career/Postsecondary Readiness	
Achieve: American Diploma Project (ADP)	college and workplace readiness
Are They Really Ready to Work? (The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management)	workforce readiness
Equipped for the Future (EFF) (National Institute for Literacy)	adult literacy and lifelong learning
The Secretary's Commission on Achieving Necessary Skills (SCANS) (U.S. Department of Labor)	workplace know-how

Review of Definitions

Criteria

Definitions for 21st Century Skills, College Readiness, and Career/Post-Secondary Readiness were reviewed to determine whether they were worthy of inclusion in this report using a set of four criteria (a-d). The criteria and their definitions (i.e., presented as key questions) are listed below.

a. Process/Rationale

Does the author provide documentation of a research and/or theory base, development process, and/or rationale for the definition?

b. Implementation

Has evidence of implementation been provided? Explain. (Note that this criterion focuses on whether the definition has been implemented, but not whether there is evidence of the *effectiveness* of the implementation. The Implementation criterion is intended to discern whether there have been attempts to apply the definition in practice.)

c. Timeliness/Relevance/Recency

Does the definition reflect current thinking in the field (i.e., with regard to key constructs, frameworks, issues, and practice)?

Does the definition contain commonalities with other definitions?

d. Coherence/Comprehensiveness

Does the author present a clear, coherent, and comprehensive definition of the term?

The four criteria (a-d) were coded as follows (i.e., in response to each key question): Yes (Y); Yes with reservations (YR); or No (N). A Yes rating was used when the documents provided or referenced the information included in the criterion. For example, for criterion "a," Process/Rationale, if a document cited the research base and described the development process for the definition or set of standards, it would receive a "Y" rating. If a document asserted that the definition was research-based without providing citations, it might receive a "YR." If no mention of process or rationale was provided, the definition would receive an "N" rating.

For each criterion, justification/explanation of the analysts' ratings were noted in the "Comments" column. For example, if a definition received a "Y" rating for criterion "a," Process/Rationale, the analyst would use the comments field to describe the information provided in the documents regarding how the definition was developed, such as the discussion of the use of a survey of experts in the field or a statistical analysis of test scores.

Additionally, analysts provided information related to the following:

- Use—How and by whom has the definition been used?
- Partners—Who or what groups form the partnership or organization that developed this definition?
- Funders—Who or what groups provided financial support to the organization that developed this definition?
- Endorsement—Who or what groups have endorsed this definition?

Finally, based on a consideration of the criteria and an overall review of the documents, analysts addressed the following question: "Is this an accurate and respected definition, appropriate for consideration in this report and review by the state?" This was a holistic judgment made by the analysts based on the evidence available. In most cases, if a definition received "Y" or "YR" ratings for at least three of the four criteria, it was included. However, a definition could be excluded on the basis of just one "N" rating if it was found to be irrelevant or inappropriate to the questions of this review.

Of the 13 definitions reviewed, 10 were ultimately selected for inclusion in this report. The definitions that were not included typically were either applications or endorsements of definitions that are presented in this report. Specific state definitions or standards for readiness that were identified were not included in this review for two reasons. Some state definitions tended to be either adaptations or implementations of other nationally recognized definitions included here (e.g., the Texas College Readiness Standards with development facilitated by EPIC). Other state definitions were found to be relevant to the scope of this project in name only (e.g., "workplace readiness" defined as adult basic education content), and would not have been appropriate as a framework for a K–12 standards revision.

The definitions included in this report were further analyzed to provide CDE with more detailed descriptions. These descriptions are presented in the following section.

DEFINITIONS

As mentioned earlier, of the 13 definitions reviewed for this report, 10 were considered appropriate for inclusion and presentation to CDE. The definitions selected for review and their authors are listed below.

21st Century Skills

enGauge (NCREL & the Metiri Group)

Framework for 21st Century Learning (Partnership for 21st Century Skills)

College Readiness

ACT College Readiness Standards & Benchmarks (ACT)

College Board Standards for College Success (College Board)

Toward a More Comprehensive Conception of College Readiness (Educational Policy Improvement Center [EPIC])

Understanding University Success (Standards for Success—Association of American Universities & The Pew Charitable Trusts)

Career/Postsecondary Readiness

American Diploma Project (Achieve)

Are They Really Ready to Work? (The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management)

Equipped for the Future (EFF) (Center for Literacy Studies)

The Secretary's Commission on Achieving Necessary Skills (SCANS) (U.S. Department of Labor)

This section presents the definitions of 21st Century Skills, College Readiness, and Career/Postsecondary Readiness selected for analysis in this report (see Methods for selection criteria and process). The definitions are presented according to the following framework (based on Kendall, 2001; Rabinowitz, Roeber, Schroeder, & Sheinker, 2006):

- evidence of external validation;
- content or subjects contained in each definition;
- articulation or organization at or across grade levels; and
- degree of specificity or granularity of the knowledge and skills defined.

In reviewing the various definitions, two categories of criteria were considered: external validation (i.e., how did the developers support their inclusion or exclusion of the knowledge and skills that comprise their definitions) and internal structures (i.e., content, articulation, granularity). We operationalize these terms, as follows:

Evidence of external validation

Among the 10 definitions, evidence provided of external validation included citations of a research or theory base, the participation of committees or focus groups, surveys, interviews, expert review, links to an assessment or other external referent, and examples

of implementation or use. The types of external validation identified for each definition are included in Table 2.

Content
Among the 10 definitions, the type of content included in the definitions tended to fall along a continuum that can be roughly described in three categories according to the definition's emphasis: core academic knowledge and skills; integrations of core academic knowledge and skills with applied skills or "thinking skills;" and applied skills or "thinking skills.

Articulation
Among the 10 definitions, the articulation or organization of the readiness standards tended to fall into three categories: cross-grade knowledge and skills; knowledge and skills to be acquired by the end of high school; and knowledge and skills to be acquired at levels leading up to high school graduation.

Granularity
Among the 10 definitions, the level of granularity or specificity of the definitions tended to fall into two categories: broad strands, themes, or skill-types with descriptors; and sets of specific "benchmark-level" skills, similar in format to state content standards.

Table 2, beginning on the next page, presents brief summaries of the definitions selected, organized for comparison according to the framework described above. This table provides an overview of key elements of each definition for comparison. Detailed summaries of each definition are included in Appendix A.

Table 2: Evidence of External Validation Content; Articulation; and Granularity.

Name	Term and brief summary of definition	Evidence of External Validation	Content/subjects	Articulation	Granularity/ specificity	Comments
21st Century Skills						
enGauge (NCREL & the Metiri Group)	*21st Century Skills:* what is needed by students, citizens, and workers in the Digital Age, as described by four skill clusters	Research based; Focus groups; Expert review; Implementation	The four clusters are: Digital-Age Literacy Inventive Thinking Effective Communication High Productivity The clusters are to be considered within the context of rigorous academic standards and are intended to provide a common understanding of—and language for discussing—21st century skills.	one set of cross-grade skill clusters	4 skill clusters, each containing 3-8 skill sets described by indicators	enGauge is no longer an active project.
Framework for 21st Century Learning (Partnership for 21st Century Skills)	*21st Century Learning:* a "vision for 21st century student success in the new global economy" described by four 21st century student outcomes and five 21st century support systems	Theory base; Research base; Focus groups; Expert review; Implementation.	Student Outcomes: Core Subjects and 21st Century Themes; Learning and Innovation Skills; Information, Media and Technology Skills; Life and Career Skills. Support Systems: 21st century standards: Assessment of 21st century skills; 21st century curriculum and instruction; 21st century professional development; 21st century learning environments	one set of cross-grade outcomes and support systems	framework containing: 4 outcomes (categories of skills or content), each containing a set of 3-5 broad themes or sub-skills; 5 support systems	Earlier documents from the Partnership for 21st Century Skills contain different organization or categorization of the skills.

Name	Term and brief summary of definition	Evidence of External Validation	Content/subjects	Articulation	Granularity/ specificity	Comments
College Readiness						
ACT College Readiness Standards & Benchmarks (ACT)	*College Readiness & Workforce Readiness:* a set of standards that describes the level of preparation a student needs to be ready to enroll and succeed—without remediation—in a credit-bearing course at a two-year or four-year institution, trade school, or technical school.	Research base; Link to assessment scores and first year college performance; Implementation.	The ACT definition includes a rigorous core curriculum in English, Reading, Writing, and additional courses in advanced mathematics (beyond Algebra II) and science (Biology, Chemistry, and Physics), referred to as "Courses for Success." The ACT standards describe the specific knowledge and skills associated with each ACT-referenced score range in English, Mathematics, Reading, Writing, and Science.	One set of end-of-high school standards for college readiness	Math: 8 sub-domains, each with 8-25 benchmarks English: 6 sub-domains, each with 10-14 benchmarks Reading: 5 sub-domains, each with 7-18 benchmarks Writing: 5 sub-domains, each with 5-14 benchmarks Science: 3 sub-domains, each with 13-20 benchmarks	ACT benchmarks are based on ACT Assessment scores and represent the "level of achievement required for students to have a high probability of success (a 75 percent chance of earning a course grade of C or better, a 50 percent chance of earning a B or better) in such credit-bearing college courses as English Composition, Algebra, and Biology."
College Board Standards for College Success (College Board)	*College Readiness:* successful performance in entry-level college courses, including Advanced Placement courses, as described by sets of ELA and mathematics content standards.	Research base; Advisory committee; Survey; Course analysis; Expert review.	ELA domains: Reading, Writing, Speaking, Listening, and Media Literacy. Math & Statistics-specific courses: in Middle School, Math I and Math II, Algebra I, Geometry, Algebra II, and Precalculus. Greater focus on statistics and probability based on	6 sets of end-of-year/course standards, across middle school and high school	ELA: 18 standards with objectives and performance expectations, organized into 5 domains across each level Math & Statistics: 31 standards (4 - 6	References recent analyses indicating that the knowledge and skills required for college success are comparable to those required by entry-level jobs with opportunity for advancement. Alternate math documents provide

Name	Term and brief summary of definition	Evidence of External Validation	Content/subjects	Articulation	Granularity/ specificity	Comments
			growing influence in everyday life and in scientific and technological applications.		standards per course) with objectives and performance expectations	standards and objectives for integrated courses and for 2 or 3-year middle school courses.
Toward a More Comprehensive Conception of College Readiness (Educational Policy Improvement Center [EPIC])	*College Readiness:* "the level of preparation a student needs in order to enroll and succeed—without remediation—in a credit-bearing general education course at a postsecondary institution…"	Research base; Theory base; Implementation.	Four dimensions of college readiness: Key Cognitive Strategies; Academic Knowledge and Skills; Academic Behaviors; and Contextual Skills and Awareness.	one set of end-of-high school general student characteristics that represent a four facet conceptual model	12 general characteristics representing four dimensions of college readiness	Document provides possible ways to measure the four dimensions and includes example performances that operationalize characteristics of college readiness. EPIC facilitated the development of the Texas College Readiness Standards.
Understanding University Success (Standards for Success—Association of American Universities & The Pew Charitable Trusts)	*College Readiness:* Knowledge and Skills for University Success are standards for six content areas describing the knowledge and skills required "to do well enough in college entry-level core academic courses to meet general education requirements and to continue on to major in a particular area."	Research base; Relevant committee input; Expert review.	English; Mathematics; Natural Sciences; Social Sciences; Second Languages; and the Arts.	one set of end-of-high school content standards and knowledge and skills foundations for each subject	2-5 knowledge and skills foundations per subject 6-27 standards per subject at standard level, each with additional benchmarks.	

Name	Term and brief summary of definition	Evidence of External Validation	Content/subjects	Articulation	Granularity/ specificity	Comments
Career/Postsecondary Readiness						
American Diploma Project (Achieve, The Education Trust, Fordham Foundation)	*College and Workplace Readiness:* "the English and mathematics that graduates must have mastered by the time they leave high school if they expect to succeed in postsecondary education or in high-performance, high-growth jobs" (Achieve, 2004).	Research based; Expert review; Task/course content analysis; Implementation .	English (4 years): Strands: language, communication, writing, research, logic, informational text, media, and literature. Mathematics (4 years): Strands: number sense and numerical operations; algebra; geometry; data interpretation, statistics and probability; with mathematical reasoning integrated throughout the 4 strands.	one set of end-of-high school benchmarks	English: 8 strands, each with 5-11 benchmarks, some benchmarks with additional indicators Mathematics: 4 strands, each with 4-12 benchmarks, each with up to 8 additional indicators	The benchmarks are supplemented with tasks and assignments that illustrate how the benchmarks are integrated and operationalized in the workplace or college.
Are They Really Ready to Work? (The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management)	*Workforce Readiness:* "Basic knowledge/skills" and the "applied skills" necessary to succeed in the workplace	Surveys and interviews of relevant persons	Basic knowledge skills are defined as the knowledge and skill areas "normally acquired in school," which "for the most part…includes the core academic subjects as identified by the no child left behind act of 2001." Applied skills are defined as those "that enable new entrants to use the basic knowledge acquired in school to perform in the workplace."	One set of cross-grade knowledge and skills	Broad subject and skill categories: 9 basic knowledge/ skills and 11 applied skills	Basic knowledge/skills and applied skills are rated by importance, projecting how their importance will change over the next five years, and indicating which emerging content areas will be critical for future workers. They are written at a very broad level. The levels of academic skills are not defined, but rather, the focus is

Name	Term and brief summary of definition	Evidence of External Validation	Content/subjects	Articulation	Granularity/ specificity	Comments
						on ranking of importance to employers.
Equipped for the Future (EFF) (National Institute for Literacy)	*Adult Literacy and Lifelong Learning:* the most important knowledge, skills and abilities needed to successfully perform entry-level work	Research base; Focus groups; Expert review; Field review; Implementation .	Skill categories: Communication Skills; Decision-Making Skills; Interpersonal Skills; Lifelong Learning Skills. Tasks: Acquire and Use Information; Use Technology; Use Systems; Work with Others; Integrity; Know How to Learn; Responsibility; Allocate Resources; Solve Problems; and Self Management.	one set of adult learner, skills categories, standards, and benchmarks	4 skill categories with 16 standards, each with 4-6 descriptions; 10 critical entry-level tasks with descriptions	National Work Readiness Credential (NWRC) assessment based on EFF skills and tasks. 10 critical task areas based on SCANS categories.
The Secretary's Commission on Achieving Necessary Skills (SCANS) (U.S. Department of Labor)	*Workplace Know-How*: Skills and personal qualities needed for solid job performance. Essential preparation for all students, both those going directly to work and those planning further education.	Research base; Interviews.	Competencies—productive use of: Resources; Interpersonal Skills; Information; Systems; and Technology. Foundation: Basic Skills Thinking Skills Personal Qualities	one set of end-of-high school competencies and their foundations with definitions	5 competencies and a 3-part foundation of skills/personal qualities	Competencies and skills/ qualities represent minimum "workforce know-how" necessary to be "work-ready" Provides examples of one level of proficiency and performance benchmarks across five proficiency levels in acquiring one skill.

CONSIDERATIONS FOR CHOOSING AMONG THE DEFINITIONS

Each definition outlined in the preceding table has been determined by the WestEd analysts to offer a reasonable and defensible definition of 21st Century Skills, College Readiness, or Career/Postsecondary Readiness (refer to Methods section for relevant criteria). While there is overlap in the interpretation of the definitions within and across terms, distinct differences in emphasis among the definitions exist. Broadly speaking, all the definitions of 21st Century Skills, College Readiness, and Career/Postsecondary Readiness included here are attempts to define the knowledge and skills students will need to succeed outside of (and in some cases while still in) high school, with the intent of helping the education system to better prepare its students to achieve that success. "Success" is operationalized differently across the definitions, and may be as specific as earning a satisfactory grade, without remediation, in an entry-level credit-bearing postsecondary course (e.g., ACT, EPIC) or defined in more general terms (e.g., enGauge, Partnership for 21st Century Skills).

This section presents considerations for choosing among the existing definitions, intended to highlight for CDE some of the trade-offs associated with each characteristic so that CDE and its stakeholders can adopt or adapt a definition most appropriate for Colorado. The considerations are presented to correspond with the framework and the characteristics of the definitions outlined in Table 2: Evidence of External Validation Content; Articulation; and Granularity.

External Validation

All the definitions included in this report contained documentation that referred to some type of external validation. This took a number of forms, including a research or theory base, committee or focus group, surveys and interviews, expert review, and examples of implementation. Nearly all cited a research base, and for some, including the College Board and the American Diploma Project, this research was specifically described as having included a course analysis, involving the study of high school and/or college coursework and expectations. A more commonly mentioned technique was the collection of information from relevant parties about academic or workplace expectations; this was often done in the form of surveys, interviews, and focus groups. In considering the various definitions, CDE may wish to consider the relative importance it places on the types (qualitative vs. quantitative) and sources of external validation evidence provided. It is recommended that as CDE considers the types and sources of evidence provided, it compares (triangulates across) multiple sources to examine the strength and comprehensiveness of the validity evidence provided.

Some of the definitions also provided evidence of external validation through a pilot or implementation study. For example, the documents for the Partnership for 21st Century skills mention several states that have developed and acted on plans for incorporating 21st Century learning into their curriculum and assessments. An examination of how individual states implement the definitions or standards associated with readiness was beyond the scope of this project. However, as the state moves toward deciding on a definition to inform its standards, CDE may wish to study further how that definition is

enacted in the states where it has been implemented, including whether implementation includes rigorous evaluation designs and reports. It would be desirable to be able to consider evidence of the effectiveness of implementation in other states.

Content

As mentioned earlier, the type of content included in the definitions tended to fall along a continuum that can be roughly described in three categories according to the definition's emphasis: core academic knowledge and skills; integration of core academic knowledge and skills and applied or "thinking skills;" and applied or "thinking skills". The definitions found to have content based on each of the three categories are listed below.

Core academic knowledge and skills

ACT College Readiness Standards & Benchmarks (ACT)
College Board Standards for College Success (College Board)
Understanding University Success (Standards for Success—Association of American Universities & The Pew Charitable Trusts)
American Diploma Project (ADP) (Achieve)

Applied skills

enGauge (NCREL & the Metiri Group)
Equipped for the Future (EFF) (National Institute for Literacy)

Integration of core academic knowledge and skills

Framework for 21st Century Learning (Partnership for 21st Century Skills)
Toward a More Comprehensive Conception of College Readiness (Educational Policy Improvement Center [EPIC])
Are They Really Ready to Work? (The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management)
The Secretary's Commission on Achieving Necessary Skills (SCANS) (U.S. Department of Labor)

Core academic knowledge and skills

The definitions that present content as core academic knowledge and skills tend to be sets of content area standards. All of the content-based definitions express such content as essential for success in postsecondary education. Thinking or process skills may be included in the content standards as they describe the expected depth or application of particular knowledge or skills, but these thinking or process skills are embedded in the academic content, rather than presented as distinct skills. The Standards for Success Knowledge and Skills for University Success also include a set of Knowledge and Skills Foundations for each subject, which extend the descriptions of thinking or process skills and attributes associated with success in that subject.

Defining readiness through academic content can provide a clear, rich, and complete description of the academic expectations for students outside of high school. Such content-based definitions of readiness may map effectively onto educators' common

understandings of readiness, especially given the last decade's emphasis on standards-based reform.

However, emphasizing core academic knowledge and skills, especially when defined in subject-specific standards, may not encourage teachers and students to see cross-subject connections and applications of skills. If thinking or process skills that have broad application are explicit in only a limited number of standards, then the broader implementation of the skills may not be carried out consistently or as intended.

Also, although there is overlap, the content areas (subjects) and content within subjects across the content-based definitions vary.[1] For this study, analysts did not conduct a comparative analysis of the specific content included in each set of standards. However, a comparison of topics covered by the American Diploma Project standards and the Standards for Success found limited overlap of topics covered between the two (Kendall, Pollack, Schwols, & Snyder, 2007). ACT benchmark documentation describes a process of developing content standards by analyzing students' ACT test scores in relation to their performance in college classes, and then creating benchmarks describing the content associated with different test scores. This variability in content suggests that CDE should conduct a closer analysis or alignment study of the specific academic content included in its selected definition to ensure that the content is consistent with the knowledge and skills valued by Colorado employers, policymakers, and educators.

Applied skills

The two definitions that focused on applied skills, enGauge and the Equipped for the Future (EFF) standards, focused on digital literacy, and adult literacy and lifelong learning, respectively. While these definitions are not void of academic content, their primary focus is on applied skills. For example, the enGauge skill clusters are intended for implementation in the context of a rigorous core curriculum, but the components of such a curriculum are not enGauge's focus. The EFF standards do include some knowledge and skills that would also be appropriate in an academic knowledge-focused definition, such as "Use Math to Solve Problems and Communicate," but these skills are presented as elements under applied skills strands such as "Decision-Making Skills."

A benefit of using a readiness definition based on applied skills is that it may clarify and focus attention on the particular skills necessary for the workplace or other postsecondary settings that are new, misunderstood, or overlooked in K–12 education. For example, enGauge is intended to help define and standardize the language used to describe 21st Century Skills and digital literacy, content that may not be familiar to K–12 educators. EFF is intended for an adult learner audience acquiring workplace and other life skills. Both frameworks contain important skills that may not be commonly integrated into K–12 programs.

[1] All four definitions include standards for English language arts (listed as English, reading, and/or writing) and mathematics. ACT also has standards for science. The Standards for Success Knowledge and Skills for University Success contain standards for six content areas: English; mathematics; natural sciences; social sciences; second languages; and the arts.

However, this primary focus (as evident in the two definitions discussed here) would likely be less useful as a framework for refinement of K–12 academic standards because it does not have the level of specificity of content that would inform such a review. Also, there is a possibility that an applied skills focus may result in those skills being viewed as a distinct set of skills that are not integrated appropriately across the academic content areas.

Integration of core academic knowledge and skills
The integration of core academic knowledge and skills is reflected in the inclusion of strands that address both core academic knowledge and applied skills. They express a shared (although not necessarily equal) importance between essential core knowledge and the process or thinking skills through which that knowledge can be applied. This is clearly seen in the goal of the report by the Educational Policy Improvement Center (EPIC), that of establishing a more "comprehensive conception of college readiness." To that end, EPIC has outlined four dimensions of college readiness: key cognitive strategies; academic knowledge and skills; academic behaviors; and contextual skills and awareness. These four dimensions attempt to make explicit the multiple factors that affect a student's readiness to succeed in college. This integrated content approach can be useful when the intent is to make explicit connections between academic content and process skills.

This approach can also provide a single comprehensive lens through which to view a system of standards, instruction, and assessments. The Partnership for 21st Century Skills attempts this with their *Framework for 21st Century Learning*. The *Framework* outlines both student outcomes and the support systems necessary to encourage those outcomes. As such, it may be useful in informing or providing goals for guiding the development of standards, curriculum, and assessment.

One limitation of the integrated approach in the definitions reviewed is that it can lack the specificity of academic content at the skill level. While academic content is a component of the integrated models, some may lack sufficient information and specificity about the particular academic content to be a source for the development of content standards. For example, while the Secretary's Commission on Achieving Necessary Skills (SCANS) outlines some basic academic skills as a component of their foundations for workplace know-how, additional information would be required for actionable standards.

Articulation
As mentioned above, the articulation or organization of the readiness standards tended to fall into three categories: cross-grade knowledge and skills; knowledge and skills to be acquired by the end of high school; and knowledge and skills to be acquired at levels leading up to high school graduation (although not necessarily grade-specific). When a definition had supplemental resources that implied multiple articulation levels, they were placed in the category of their primary focus. For example, the Partnership for 21st Century Skills has developed content maps with samples of how 21st Century Skills could be implemented at grades 4, 8, and 12, but the *Framework for 21st Century Learning* is a

cross-grade framework. As such, analysts categorized this definition as cross-grade knowledge and skills.

The definitions articulated at each level are listed below.

Cross-grade knowledge and skills

enGauge (NCREL & the Metiri Group)
Framework for 21st Century Learning (Partnership for 21st Century Skills)
Are They Really Ready to Work? (The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management)

End-of-high school knowledge and skills

Toward a More Comprehensive Conception of College Readiness (Educational Policy Improvement Center [EPIC])
Understanding University Success (Standards for Success—Association of American Universities & The Pew Charitable Trusts)
American Diploma Project (ADP) (Achieve)
Equipped for the Future (EFF) (National Institute for Literacy)
The Secretary's Commission on Achieving Necessary Skills (SCANS) (U.S. Department of Labor)

Knowledge and skills to be acquired at levels leading up to graduation

ACT College Readiness Standards & Benchmarks (ACT)
College Board Standards for College Success (College Board)

A key consideration related to the articulation or organization of a definition is the state's intended use or the purpose for which a definition is being adopted. Although all definitions can be refined to meet the specific needs of the state, the cross-grade and cross-subject area knowledge and skills tend to lend themselves to serving as guiding principles or overarching goals, whereas the knowledge and skills for the end of high school or to be acquired at levels leading up to graduation tend to serve as specific benchmarks or targets for acquisition of knowledge or skills. Each is discussed further below.

Cross-grade knowledge and skills

Cross-grade knowledge and skills can express at a broad level the state's expectations for learning for all students. They can serve as guiding principles for the development of standards and curriculum across grades and subjects. They may also offer a common language, which can be applied at a number of grade levels and across subjects. For example, several states have adopted the *Framework for 21st Century Learning* but each state's initiative has characteristics particular to that state's needs.

Articulation at this level is less useful in establishing the knowledge and skills to be learned at any one grade level or grade band. As such, the cross-grade articulation may lack the specificity desired if they are to guide the development of differentiated

standards, and associated curricula or other student learning supports. For example, the *Are They Really Ready for Work?* report details the topics and skills found to be important in the workplace, but does so at such a high level that, while it could inform or reinforce the choice of content areas included in a course of study, additional information would be necessary to demonstrate how the knowledge and skills would scale up or down with the grade levels.

End-of-high school knowledge and skills
Articulation of knowledge and skills for the end of high school level provides expectations for the content and level of knowledge and skills required of high school graduates. This was a common characteristic among the College Readiness and Career/Postsecondary Readiness definitions, as might be expected, given their intention of defining the knowledge and skills required for success in college, workforce training, or entry-level jobs. Standards based on this articulation can set clear expectations for what high school graduates will know and be able to do, and communicate these expectations to all stakeholders (students, educators, families, employers). The American Diploma Project benchmarks, as part of the larger ADP initiative, are designed to communicate such expectations, and include associated sample tasks from the workplace or college classroom to help operationalize the benchmarks.

In order to implement these standards effectively, educators must have an understanding of how students will reach these end-of-high school expectations. Backwards mapping to grade levels or key benchmarks is necessary to ensure that standards, curriculum, instruction, and assessment are aligned to the content (i.e., knowledge and skills) that will prepare students to meet those end-of-high school expectations. When considering whether to accept an articulation of this type, CDE should consider whether this approach allows students with different interests or skill sets to succeed, or whether a "one size fits all approach" is sufficiently flexible for the range of likely postsecondary scenarios high school graduates are expected to face over the next decade, and beyond.

Knowledge and skills to be acquired at levels leading up to graduation
The College Board Standards for College Success and ACT College Readiness Standards and Benchmarks are the two definitions that articulated skills across a number of levels. For the College Board Standards, the six levels leading up to and including the end of high school are not necessarily grade-specific, but seem to correspond to the content progression from middle school through high school. In ACT, benchmarks for grades 8, 10, and 12 based on ACT-developed assessments are provided to delineate the skills necessary for success in college.

This articulation shares the strengths of the end-of-high school articulation described above. Articulation at multiple levels helps to communicate the message that preparing for college or the workplace begins before high school, and it provides guidance as to how the knowledge and skills should progress at each level (e.g., grade, grade span, or course) to ensure adequate preparation for the next level.

However, if CDE determines that readiness standards are to be adopted as an addition to the core content standards, rather than be integrated among them, the multi-level articulation may be excessive or cumbersome for curriculum and instruction, since it may be seen as an additional or competing set of content standards.

Granularity

As mentioned above, the level of granularity or specificity of the definitions tended to fall into two categories: broad strands, themes, or skill-types with descriptors; and sets of specific "benchmark-level" skills, similar in format to typical state content standards. The granularity, or level of specificity, of how each definition is structured has implications for how it is implemented.

The definitions at each level of granularity or specificity are listed below:

Broad strands or themes with descriptors

- enGauge (NCREL & the Metiri Group)
- *Framework for 21st Century Learning* (Partnership for 21st Century Skills)
- *Toward a More Comprehensive Conception of College Readiness* (Educational Policy Improvement Center [EPIC])
- *Are They Really Ready to Work?* (The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management)
- The Secretary's Commission on Achieving Necessary Skills (SCANS) (U.S. Department of Labor)

Specific "benchmark-level" skills

- ACT College Readiness Standards & Benchmarks (ACT)
- College Board Standards for College Success (College Board)
- *Understanding University Success* (Standards for Success—Association of American Universities & The Pew Charitable Trusts)
- American Diploma Project (ADP) (Achieve)
- Equipped for the Future (EFF) (National Institute for Literacy)

Broad strands, themes, or skill-types with descriptors

A readiness definition expressed as broad themes or skill types can serve to guide the development of standards and curriculum. It can also communicate clearly the high-level goals of the state for student achievement and success. SCANS, the oldest definition reviewed for this report, outlines a comprehensive profile of a workplace-ready graduate through five competencies (productive use of resources, interpersonal skills, information, systems, and technology) and three foundations (basic skills, thinking skills, and personal qualities). While these competencies and foundations are defined and described, the broader structure allows for flexibility of adaptation to fit specific content needs. However, CDE will still need to provide sufficient detail, structure, and support (e.g., professional development) to ensure that the goals as implemented are compatible with the goals of the state.

Specific "benchmark-level" skills
A readiness definition expressed as benchmark-level skills or standards should be sufficiently specific to guide instruction. The readiness benchmarks can either be adopted as standards or integrated into the state's existing standards. A definition expressed at this level may also be more measurable than the broad themes seen in the other definitions. This format may be most appropriate when there is a defined set of knowledge and skills that will be assessed, as in an end-of-course or admissions test. For example, the EFF standards are organized at three levels of specificity. Under skill category "Decision-Making Skills" are three standards, each with 5-6 benchmarks. These benchmarks, such as "use information from diverse sources to arrive at a clearer understanding of the problem and its root causes," or "establish criteria for evaluating effectiveness of solution or decision," define the skill at a level that can be taught and assessed. In fact, a subset of the EFF standards forms the basis for the assessment linked to the National Work Readiness Credential.

Questions remain whether these skills can be taught in general or must be embedded in specific content areas. CDE must determine if the skills generalize across content areas or must be taught content-specific (e.g., math/science vs. social science). Additionally, as a guiding framework for standards revision, the benchmark level may be somewhat limiting in terms of cross-content themes and essential skills.

Additional Considerations
In addition to the considerations based on the criteria discussed above, the following considerations related to the definitions of 21st Century Skills, College Readiness, and Career/Postsecondary Readiness emerged from this review.

- CDE may wish to combine elements of existing definitions. For example, a framework of rigorous academic knowledge and skills could be used to elaborate the content of a framework of integrated academic knowledge and skills and applied or process skills.

- CDE may wish to investigate further how the definitions are being implemented by states. Specifically, are there state contexts particularly suited to any one definition? Have any definitions been interpreted or implemented in ways that increase the effectiveness or appropriateness of any one definition?

- CDE should confirm that the assumptions behind any definition they choose to adopt or adapt also apply to the students of Colorado. Are there any factors specific to Colorado's context that would support one set of assumptions over another?

- Finally, as discussed above, CDE should consider whether any definitions adopted or adapted allow students with different interests or skill sets to succeed, or whether a "one size fits all approach" is sufficiently flexible for the range of likely postsecondary scenarios high-school graduates are expected to face over the next decade, and beyond.

RESOURCES REVIEWED

Below are the resources reviewed for all the readiness definitions identified and considered. The definitions that met the criteria described in the Methods section are discussed in the report.

Global Education (CCSSO—SCASS.21)

The Council of Chief State School Officers. (2006, November). *Global education policy statement*. Retrieved February 21, 2008, from http://www.ccsso.org/content/pdfs/Global%20Education%20FINAL%20lowrez.pdf

enGauge (NCREL & the Metiri Group)

Ciske, S. (2005). *21st century skills and information & technology literacy standards: A Wisconsin comparison*. Retrieved February 20, 2008, from http://www.dpi.state.wi.us/imt/ppt/Impl21Skills.ppt

Metiri Group & the North Central Regional Educational Laboratory. (2003). *enGauge 21st century skills: Literacy in the digital age*. Retrieved February 28, 2008, from http://www.ncrel.org/engauge/skills/engauge21st.pdf

Metiri Group & the North Central Regional Educational Laboratory. (n.d.). *enGauge 21st century skills for 21st century learners*. Retrieved February 19, 2008, from http://www.metiri.com/21/Metiri-NCREL21stSkills.pdf

North Central Regional Educational Laboratory. (n.d.). *enGauge: A framework for effective technology use*. Retrieved March 6, 2008, from the enGauge Web site: http://www.ncrel.org/engauge/

Framework for 21st Century Learning (Partnership for 21st Century Skills)

The Partnership for 21st Century Skills. (2007, July). *Framework for 21st century learning*. Washington, DC: Author. Retrieved February 28, 2008, from http://www.21stcenturyskills.org/documents/frameworkflyer_072307.pdf

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21st Century Workforce Commission

U.S. 21st Century Workforce Commission. (2000, June). *A nation of opportunity: Building America's 21st century workforce*. Retrieved February 20, 2008, from http://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1003&context=key_workplace

ACT College Readiness Standards & Benchmarks (ACT)

ACT, Inc. (2005). *Crisis at the core: Preparing all students for college and work*. Retrieved March 7, 2008, from http://www.act.org/path/policy/pdf/crisis_report.pdf

ACT, Inc. (2006). *Ready for college and ready for work: same or different?* Retrieved March 7, 2008, from http://www.act.org/path/policy/pdf/ReadinessBrief.pdf

ACT, Inc. (2006). *Ready to succeed: All students prepared for college and work*. Retrieved March 7, 2008, from http://www.act.org/research/policymakers/pdf/ready_to_succeed.pdf

ACT, Inc. (n.d.). *College readiness standards — English*. Retrieved March 7, 2008, from http://www.act.org/standard/pdf/english.pdf

ACT, Inc. (n.d.). *College readiness standards — reading*. Retrieved March 7, 2008, from http://www.act.org/standard/pdf/reading.pdf

ACT, Inc. (n.d.). *College readiness standards — ACT assessment writing test*. Retrieved March 7, 2008, from http://www.act.org/standard/pdf/writing.pdf

ACT, Inc. (n.d.). *College readiness standards — mathematics*. Retrieved March 7, 2008, from http://www.act.org/standard/pdf/math.pdf

ACT, Inc. (n.d.). *College readiness standards — science*. Retrieved March 7, 2008, from http://www.act.org/standard/pdf/science.pdf

College Board Standards for College Success (College Board)

The College Board. (2006). *College Board standards for college success: English language arts*. New York: Author. Retrieved March 13, 2008, from http://www.collegeboard.com/prod_downloads/about/association/academic/english-language-arts_cbscs.pdf

The College Board. (2006). *College Board standards for college success: Mathematics & statistics*. New York: Author. Retrieved March 13, 2008, from http://www.collegeboard.com/prod_downloads/about/association/academic/mathematics-statistics_cbscs.pdf

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Conley, D. T. (2007). *Toward a more comprehensive conception of college readiness*. Eugene, OR: Educational Policy Improvement Center. Retrieved February 13, 2008, from http://www.s4s.org/upload/Gates-College%20Readiness.pdf

Pathways to College Network

The Pathways to College Network. (2004). *A shared agenda: A leadership challenge to improve college access and success*. Boston: The Educational Resources Institute. Retrieved March 17, 2008, from http://www.teri.org/pdf/research-studies/ResearchReport_SharedAgenda.pdf

The Pathways to College Network. (2007). *Academic rigor: At the heart of college access and success* (A College Readiness Issue Brief). Boston: The Educational Resources Institute. Retrieved March 17, 2008, from http://www.pathwaystocollege.net/pdf/rigor.pdf

Understanding University Success **(Standards for Success—Association of American Universities & The Pew Charitable Trusts)**

Conley, D. E. (Dir.). (2003). *Understanding university success: A report from Standards for Success, A project of the Association of American Universities and The Pew Charitable Trusts*. Eugene, OR: Center for Educational Policy Research. Retrieved February 28, 2008, from http://www.s4s.org/UUS_Complete.pdf

Texas College Readiness Standards

Texas Higher Education Coordinating Board. (2008, January). *Texas college readiness standards*. Retrieved February 28, 2008, from http://www.thecb.state.tx.us/collegereadiness/CRS.pdf

Washington College Readiness Definitions

Aoki, M. A. (2007, January). *Preparing students to live and work in a global economy: College readiness in the arts, social studies, and world languages* (Policy Brief Vol. 1, No. 2). Olympia, WA: The Washington Higher Education Coordinating Board. Retrieved February 27, 2008, from http://www.hecb.wa.gov/boardmtgs/documents/TAB07BCollegeReadinessPolicyBrief12-06ps.pdf

Transition Mathematics Project. (2006, March). *College readiness mathematics standards*. Olympia, WA: Washington State Board for Community and Technical Colleges. Retrieved March 12, 2008, from http://www.transitionmathproject.org/assets/docs/standards/crs_march23_2006.pdf

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Washington Higher Education Coordinating Board. (2006, October). *Status report on English and science college readiness*. Retrieved February 28, 2008, from http://www.hecb.wa.gov/boardmtgs/documents/Tab7-combinedreportandppt.pdf

Washington Higher Education Coordinating Board. (2007, January). *Draft college readiness definitions – English & science*. Retrieved February 28, 2008, from http://www.hecb.wa.gov/BoardMtgs/documents/CollegeReadinesscombined.pdf

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Washington Higher Education Coordinating Board. (2007, January). *Science college readiness definitions – preliminary*. Retrieved February 27, 2008, from http://www.learningconnections.org/clc/hecb/resources/science/Sci%20Preliminary%20CR%20Definitions_010807.doc

Achieve: American Diploma Project (ADP)

The American Diploma Project. (2004). *Ready or not: Creating a high school diploma that counts*. Washington, DC: Achieve, Inc. Retrieved February 29, 2008, from http://www.achieve.org/files/ADPreport_7.pdf

The American Diploma Project. (2007, December). *Aligning high school graduation requirements with the real world: A road map for states*. Washington, DC: Achieve, Inc. Retrieved February 29, 2008, from http://www.achieve.org/node/980

The American Diploma Project. (2008, February). *Closing the expectations gap: An annual 50-state progress report on the alignment of high school policies with the demands of college and careers*. Washington, DC: Achieve, Inc. Retrieved February 29, 2008, from http://www.achieve.org/files/50-state-2008-final02-25-08.pdf

Are They Really Ready to Work?

The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, & the Society for Human Resource Management. (2004). *Are they really ready to work? Employers' perspectives on the basic knowledge and applied skills of new entrants to the 21st century U.S. workforce*. Retrieved February 20, 2008, from http://www.21stcenturyskills.org/documents/FINAL_REPORT_PDF09-29-06.pdf

Equipped for the Future (EFF)

Equipped for the Future. (2006, August). *Getting ready for the Work Readiness Credential: A guide for trainers and instructors of jobseekers*. Retrieved March 12, 2008, from http://www.workreadiness.com/images/training.pdf

The National Work Readiness Council. (2006) *The National Work Readiness Credential profile: What new workers in entry-level jobs need to be able to do*. Retrieved March 12, 2008, from http://eff.cls.utk.edu/PDF/WRCProfileLink092005.pdf

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Stein, S. (2001, July). *Equipped for the Future content standards: What adults need to know and be able to do in the 21st century*. Washington, DC: The National Institute for Literacy. Retrieved March 19, 2008, from http://eff.cls.utk.edu/PDF/standards_guide.pdf

Florida Workplace Readiness Standards

Adult Basic Education Florida. (n.d.). *Workplace readiness skills checklist*. Retrieved February 13, 2008, from http://www.abeflorida.org/pdf/Resource_Guides/work_checklist04.pdf

Massachusetts Career-Development Education

Massachusetts Department of Elementary and Secondary Education. (2006, September). *Relevance, the missing link: The 2005 Massachusetts career-development education guide*. Retrieved February 21, 2008, from http://www.doe.mass.edu/cd/resources/cdeguide.pdf

New Jersey Cross-Content Workplace Readiness Standards

New Jersey Department of Education. (2001). *New Jersey cross-content workplace readiness curriculum framework: A roadmap for learning*. Retrieved February 13, 2008, from http://www.state.nj.us/education/frameworks/ccwr/ccwrall.pdf

Virginia's Workplace Readiness Skills

Virginia's Workplace Readiness Skills. (n.d.). Retrieved February 21, 2008, from http://www.cteresource.org/publications/featured/wpr/index.html

The Secretary's Commission on Achieving Necessary Skills (SCANS)

The Secretary's Commission on Achieving Necessary Skills. (2000). *What work requires of schools: A SCANS report for America 2000*. Retrieved March 3, 2008, from the U.S. Department of Labor, Employment & Training Administration's Web site: http://wdr.doleta.gov/SCANS/whatwork/whatwork.pdf

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APPENDIX A: DETAILED SUMMARIES OF READINESS DEFINITIONS

enGauge (NCREL & the Metiri Group)

Term defined: 21st Century Skills

Key components of the definition
The enGauge 21st Century Skills are presented as a set of four clusters of skills students need in order to successfully participate in the workplace and in society in the "Digital Age." The skills are intended for use in informing policy, and the development and implementation of academic standards. The following information is provided in the North Central Regional Education Laboratory (NCREL) and Metiri Group report "enGauge 21st Century Skills: Literacy in the Digital Age" (2003).

> Based on two years of study, the enGauge 21st Century Skills represent the fresh, serious, new perspective required in light of recent historical events, globalization, and the idiosyncrasies of the Digital Age. The following skill clusters, when considered within the context of rigorous academic standards, are intended to provide the public, business and industry, and educators with a common understanding of—and language for discussing—what is needed by students, citizens, and workers in the Digital Age. (p. 12)

The enGauge 21st Century Skills are composed of the following four skill clusters, each containing multiple skill sets, as shown below. Source documentation provides further description at each level.

Digital-Age Literacy

- Basic, Scientific, Economic, and Technological Literacies
- Visual and Information Literacies
- Multicultural Literacy and Global Awareness

Inventive Thinking

- Adaptability and Managing Complexity, and Self-Direction
- Curiosity, Creativity, and Risk Taking
- Higher-Order Thinking and Sound Reasoning

Effective Communication

- Teaming, Collaboration, and Interpersonal Skills
- Personal, Social, and Civic Responsibility
- Interactive Communication

High Productivity

- Prioritizing, Planning, and Managing for Results
- Effective Use of Real-World Tools
- Ability to Produce Relevant, High-Quality Products

Key aspects of development and use

Developed in partnership between the Metiri Group and the NCREL, with funding from the Institute of Education Sciences (IES), enGauge is presented as a model for the effective use of educational technology. According to source material, enGauge is research-based. It was developed through literature reviews; research on emerging characteristics of the "Net Generation"; review of reports on workforce trends; analysis of nationally recognized skill sets; input from educators; data from educator surveys; reactions from constituent groups; expert review; state-level conference sessions, surveys, and focus groups; and mapping to alternative frameworks. Documentation includes extensive citations for each element, framework maps, and resource lists.

In 2005, the Wisconsin Model Academic Standards were matched to enGauge's 21st Century Skills. Funding for the enGauge surveys ended in 2005, except for Wisconsin projects, which were funded through 2007. No new survey projects will be supported through the website, which is scheduled to be discontinued March 31, 2008.

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North Central Regional Educational Laboratory. (n.d.). *enGauge: A framework for effective technology use*. Retrieved March 6, 2008, from the enGauge Web site: http://www.ncrel.org/engauge/

Framework for 21st Century Learning (Partnership for 21st Century Skills)

Term defined: 21st Century Learning

Key components of the definition
The updated 2007 version of the Partnership for 21st Century Skills' *Framework for 21st Century Learning* describes the Partnership's "vision for 21st century student success in the new global economy" (Partnership for 21st Century Skills, 2007). The framework consists of student outcomes and five critical support systems that ensure student mastery of 21st century skills, as outlined below.

- 21st Century Student Outcomes
  - Core Subjects and 21st Century Themes
    - Core subjects: English, reading or language arts; World languages; Arts; Mathematics; Economics; Science; Geography; History; and Government and Civics
    - 21st century interdisciplinary themes: Global awareness; Financial, economic, business, and entrepreneurial literacy; Civic literacy; and Health literacy

- Learning and Innovation Skills
  - Creativity and innovation
  - Critical thinking and problem solving
  - Communication and collaboration

- Information, Media and Technology Skills
  - Information literacy
  - Media literacy
  - ICT (Information, communications, and technology) literacy

- Life and Career Skills
  - Flexibility and adaptability
  - Initiative and self-direction
  - Social and cross-cultural skills
  - Productivity and accountability
  - Leadership and responsibility

- 21st Century Support Systems
  - 21st century standards
  - Assessment of 21st century skills
  - 21st century curriculum and instruction
  - 21st century professional development
  - 21st century learning environments

Key aspects of development and use

According to source documents, the rationale for this framework is based on learning theory and reports about the changing requirements of the workplace and college. Source documents also provide a brief historical overview of how public schooling has changed over time to meet the needs of society. While the organization and description of the framework and learning skills has been modified over the past five years, the themes have remained.

Several states have implemented initiatives related to the Partnership for 21st Century Skills. For example, North Carolina was the first Leadership State in the Partnership for 21st Skills Leadership Project, and its state board endorsed a framework based on 21st century skills. West Virginia revised its content standards, created a 21st century credential for high school graduates, has trained administrators in 21st century skills, and has offered online professional development courses and self-assessment in 21st century skills for teachers. States have used the framework to develop 21st century skills initiatives. Initiatives are state-specific and may include incorporation of 21st century skills into standards, assessments, and graduation requirements.

The original work was supported by a two-year grant from USED. The member organizations in the Partnership include technology companies, educational software and publishing companies, media organizations, educational professional organizations, and educational foundations including Adobe Systems Incorporated, Agilent Technologies Foundation, American Association of School Librarians, American Federation of Teachers, Apple, BellSouth Foundation, Cable in the Classroom, Cisco Systems, Inc., Corporation for Public Broadcasting, Dell Inc., Educational Testing Service, Ford Motor Company Fund, Intel Foundation, JA Worldwide, LeapFrog School House, McGraw-Hill Education, Microsoft Corporation, National Education Association, Oracle Education Foundation, Pearson Education, SAP, SAS, Texas Instruments Incorporated, Thomson Gale, Time Warner Inc., and Verizon.

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ACT College Readiness Standards & Benchmarks (ACT)

Term defined: College readiness/Workforce readiness

Key components of the definition
The terms college readiness and workforce readiness refer to the preparation necessary for success in postsecondary education or the workplace. College readiness is "the level of preparation a student needs to be ready to enroll and succeed—without remediation—in a credit-bearing course at a two-year or four-year institution, trade school, or technical school. Increasingly, however, college readiness also means *workplace* readiness." (ACT, 2005).

ACT describes the level of preparation needed for success in first-year college courses as comparable to the level of preparation needed for success in workforce training programs. This suggests that all students should experience a rigorous academic program. ACT determined this through statistical concordance of their ACT college readiness test and ACT WorkKeys workforce readiness program. (ACT, 2006).

ACT considers that students are better prepared for college and the workforce when they have a rigorous core curriculum *and* additional courses in advanced mathematics (beyond Algebra II) and science (Biology, Chemistry, and Physics), which ACT refers to as "Courses for Success." ACT defines its core curriculum (adapted from *A Nation at Risk*), including its Courses for Success, as follows:

- English (four years or more)—one year credit each for English 9, English 10, English 11, and English 12;
- Mathematics (three years or more)—one year credit each for Algebra I, Algebra II, and Geometry. One half-year credit each for Trigonometry, Calculus, or other mathematics courses beyond Algebra II (such as Computer Mathematics/ Computer Science);
- Social studies (three years or more)—one year credit each for American History, World History, and American Government. One half year credit each for Economics, Geography, Psychology, and other History (for example, European, State); and
- Natural sciences (three years or more)—one year credit each for General/Physical/Earth Science, Biology, Chemistry, and Physics.

ACT developed College Readiness Benchmarks based on ACT Assessment scores in English, Mathematics, Reading, and Science that represent the "level of achievement required for students to have a high probability of success (a 75 percent chance of earning a course grade of C or better, a 50 percent chance of earning a B or better) in such credit-bearing college courses as English Composition, Algebra, and Biology." ACT's College Readiness Standards describe the specific knowledge and skills associated with each benchmark level in English, Mathematics, Reading, and Science. This includes benchmarks for grades 8 and 10 based on ACT's EXPLORE and PLAN assessments.

Key aspects of development and use

ACT source documents describe research that established comparability of college and workforce readiness and the process for analyzing first-year college success and the associated benchmark score. ACT assessments are widely used in admissions decisions for college. Their definition of readiness is dependent on the accuracy of the connections made between students' ACT scores and classroom grades in first-year college courses.

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College Board Standards for College Success (College Board)

Term defined: College Readiness

Key components of the definition
The College Board presents sets of English and mathematics standards, objectives, and performance expectations that make explicit the content knowledge, skills, and strategies deemed necessary for successful performance in entry-level college courses, including high school advanced placement courses. The English Language Arts standards and objectives provide expectations for student proficiency at each of six levels, beginning in middle school (but not grade-specific). The 18 standards with level-specific objectives and performance expectations are organized into five domains: reading, writing, speaking, listening, and media literacy.

The Mathematics and Statistics standards and objectives combine process expectations with content knowledge to articulate performance expectations for six college-preparatory courses in mathematics: two middle school courses (Mathematics I and Mathematics II) and Algebra I, Geometry, Algebra II, and Pre-calculus. There are 31 mathematics standards, with four to six standards per year or course. The standards purposefully place greater focus on statistics and probability "based on the ever-growing influence of statistics and probability in everyday life and in scientific and technological applications across our society." Also, three-year alternative standards are provided for middle school mathematics (Middle School Mathematics A, B, and C, for grades 6 through 8), and the standards are adapted for integrated curricula as well: Integrated Mathematics I and II for middle school may be a two- or three-year curriculum, and Integrated Mathematics III through VI is designed for grades 8/9 through 11/12, depending on the number of years for Integrated Mathematics I and II (grades 6 and 7 or grades 6 through 8).

Key aspects of development and use
Source documents describe the composition of committees, various steps taken in determining definitions and the developmental progressions across six levels in the two subject areas. Reviewers also represent respected organizations and current thinking. According to source documents, the development of these definitions was informed by the Achieve *Ready or Not* document; ACT's *Ready for College and Ready for Work: Same or Different?*; and the Standards for Success document *Understanding University Success.*

By articulating the standards across six developmental levels, College Board provides a detailed view of how students progress, and this amount of specificity may assist implementation or integration of these standards with a state's current standards in English language arts and mathematics.

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***Understanding University Success*: Standards for Success:**
(Association of American Universities and The Pew Charitable Trusts)

Term defined: College Readiness

Key components of the definition
Standards for Success describes the knowledge and skills students need for university success as sets of standards for six content areas. The standards are general statements of expectations for being successful in entry-level university courses and are organized by the foundations for each content area.

English
- *Foundations:* Reading, Comprehension & Literature; Writing & Editing; Information Gathering: Notes & Research; Analysis, Critique & Connections; and Orientation Towards Learning
- *Standards:* Reading & Comprehension; Writing; Research Skills; and Critical Thinking Skills

Mathematics
- *Foundations:* Understanding Mathematics; Problem Solving, Technology & Communication; and Orientation Towards Learning
- *Standards:* Computation; Algebra; Trigonometry; Geometry; Mathematical Reasoning; and Statistics

Natural Sciences
- *Foundations:* Basic Knowledge; Thinking about Science; Solving Problems, Asking Questions; Reading, Writing, & Communication; and Orientation Towards Learning
- *Standards:* General Foundation Skills; Science and Society; Environmental Science; Biology; Chemistry; and Physics

Social Sciences
- *Foundations:* Basic Knowledge & Skills; General Sense of History & Geography; Reading, Research & Analysis; and Orientation Towards Learning
- *Standards:* General Knowledge & Skills; History; Economics; Geography; Political Science (Civics); Sociology; Inquiry, Research & Analysis; and Communication

Second Languages
- *Foundations:* The Basics; and Orientation Towards Learning
- *Standards:* Communication Skills; Culture; Structure; and Learning Behaviors

The Arts
- *Foundations:* general description of student attributes and character traits
- *Standards:* Art History; Dance; Music; Theatre; and Visual Arts

"Success" as defined by these standards means the ability to do well enough in college entry-level core academic courses to meet general education requirements and to continue on to major in a particular area.

Key aspects of development and use

Understanding University Success is a project of the Association of American Universities and The Pew Charitable Trusts. These standards, often referred to as "Knowledge and Skills for University Success," are the result of a two-year study in which more than 400 faculty and staff members from 20 research universities participated in extensive meetings and reviews designed to identify what students must do to succeed in entry-level courses at their institutions. The document states, "…the standards enumerated here should be considered a starting point for a continuing dialog about what is expected of entering students." The standards are comprehensive—detailing what successful students should do, know, and/or understand as a foundation in each of the six content areas.

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***Toward a More Comprehensive Conception of College Readiness,* prepared for the Bill & Melinda Gates Foundation by the Educational Policy Improvement Center (EPIC)**

Term defined: College Readiness

Key components of the definition
The document defines college readiness operationally as "the level of preparation a student needs in order to enroll and succeed—without remediation—in a credit-bearing general education course at a postsecondary institution that offers a baccalaureate degree or transfer to a baccalaureate program (2007)." "Succeed" is further defined as "completing entry-level courses at a level of understanding and proficiency that makes it possible for the student to consider taking the next course in the sequence or the next level of course in the subject area." The author describes a conceptual model of college readiness with the four facets of college readiness outlined below.

- Key Cognitive Strategies, including intellectual openness; inquisitiveness; analysis; reasoning, argumentation, proof; interpretation; precision and accuracy; and problem solving
- Academic Knowledge and Skills, consisting of two Overarching Academic Skills—writing and research, and six Core Academic Subjects Knowledge and Skills—English, math, science, social studies, world languages, and the arts
- Academic Behaviors encompassing a range of behaviors that "reflect greater student self-awareness, self-monitoring, and self control" which are independent of a particular content area
- Contextual Skills and Awareness, a broad category encompassing primarily "the privileged information necessary to understand how college operates as a system and culture" and includes a "systemic understanding of the postsecondary educational system combined with specific knowledge of the norms, values, and conventions of interactions in the college context, and the human relations skills necessary to cope within this system…"

The document presents "a highly representative list of knowledge, skills, and attributes" or "keystone skills" the college-ready student must possess. These represent the types of indicators necessary to gauge a more comprehensive notion of college readiness. A list of 12 general characteristics, not intended to be all-inclusive, provides a means of measuring the degree to which students are college-ready. Example performances are provided that further describe how students might show proficiency in the general characteristics.

Key aspects of development and use
The Education and Policy Improvement Center prepared this report for the Bill & Melinda Gates Foundation. It provides a clear and detailed process for arriving at its college readiness definitions; the definitions themselves are supported by theoretical and empirical studies by the author, research in peer-reviewed journals, and nationally recognized organizations, including the Standards for Success project sponsored by the Association of American Universities, Achieve's American Diploma Project, the College Board Standards for College Success, and the ACT sets of standards. The definition is

cited by other organizations and college readiness definitions, including the state of Texas, Pathways to College Network, and the Massachusetts College and Career Readiness Summit. Using this conceptual model and definitions, EPIC facilitated the development of the Texas College Readiness Standards.

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American Diploma Project (Achieve, The Education Trust, Fordham Foundation)

Term defined: College and Workplace Readiness

Key components of the definition
The American Diploma Project (ADP) defines college and workplace readiness with benchmarks requiring four years of English and mathematics, with emphases on literature, writing, reasoning, logic, and communication skills in English, and emphases on geometry, data analysis, statistics, advanced algebra, reasoning, and problem solving in mathematics. The ADP benchmarks are organized according to 12 strands, as indicated below.

English

A. Language
B. Communication
C. Writing
D. Research
E. Logic
F. Informational Text
G. Media
H. Literature

Mathematics, with mathematical reasoning skills "woven throughout" the four strands

I. Number Sense and Numerical Operations
J. Algebra
K. Geometry
L. Data Interpretation, Statistics and Probability

These benchmarks, illustrated with examples, provide a coherent definition of college and workplace readiness. The definition is intentionally limited to the English and mathematics skill areas, with the understanding that these are cross-disciplinary skills, necessary for success across the content areas in college and the workplace.

Key aspects of development and use
The document *Ready or Not: Creating a High School Diploma that Counts* (2004) expresses the concern that, for many students, a high school diploma is no longer a signifier of being prepared to succeed in college or the workplace. Due to a number of factors, including shifts in employment opportunities in the U.S., high school graduates intending to go directly into the workforce now need preparation that was once considered the college preparation level (Achieve, 2007). To address this issue, the American Diploma Project developed an integrated system of benchmarks that "describe in specific terms the English and mathematics that graduates must have mastered by the time they leave high school if they expect to succeed in postsecondary education or in high-performance, high-growth jobs" (Achieve, 2004). Developed from research and input from postsecondary educational institutions and employers, the benchmarks are supplemented with tasks and assignments that illustrate how the benchmarks are integrated and operationalized in the workplace or college.

The ADP benchmarks are rooted in research on current and future employment opportunities and the skills needed for success in them. Initially, five partner states (IN, KY, MA, NV, and TX) were involved in identifying the knowledge and skills. Support for the project includes The William and Flora Hewlett Foundation and the Bill & Melinda Gates Foundation.

Achieve has conducted formal alignment reviews of high school mathematics and English language arts standards in 12 states and "found them to be well aligned with the college-and career-ready expectations in the ADP benchmarks" (Achieve, 2008). In addition, 32 states have joined the ADP Network, involving a commitment to a four-part policy agenda to improve readiness (Achieve, 2008).

The ADP recommends that states clearly define specific core course content, as opposed to only course titles, when establishing graduation requirements. Further, ADP recommends alignment of content standards and assessments to the benchmarks to ensure consistency of learning expectations and so that a high school diploma will be an indicator across schools of readiness for college and the workplace. Such consistency, ADP suggests, would allow colleges and employers to use high school assessment scores and successful completion of graduation requirements in making admission and hiring decisions.

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***Are They Really Ready to Work?* (The Conference Board, Corporate Voices for Working Families, the Partnership for 21st Century Skills, and the Society for Human Resource Management)**

Term defined: Workforce Readiness

Key components of the definition
Are They Really Ready to Work? employs a methodology that establishes the basic knowledge/skills and the applied skills necessary to succeed in the workplace, rating them by importance, projecting how their importance will change over the next five years, and indicating which emerging content areas will be critical for future workforce entrants. Basic knowledge/skills are defined as the knowledge and skill areas "normally acquired in school," which "includes the core academic subjects as identified by the no child left behind act of 2001." Applied skills are defined as those "that enable new entrants to use the basic knowledge acquired in school to perform in the workplace," and are derived primarily from the Partnership for 21st Century Skills, with additional consultation of several members of the Conference Board's Business and Education Council. Below are the basic knowledge/skills, applied skills, and emerging content areas listed in the order of importance for high-school graduates. Written at a broad level, the focus is on ranking of importance to employers.

Basic Knowledge/Skills

- Reading Comprehension (in English)
- English Language (spoken)
- Writing in English (grammar, spelling, etc.)
- Mathematics
- Foreign Languages*
- Science
- Government/Economics
- History/Geography
- Humanities/Arts

Applied Skills

- Professionalism/Work Ethic – Demonstrate personal accountability, effective work habits, such as, punctuality, working productively with others, and time and workload management.
- Teamwork/Collaboration – Build collaborative relationships with colleagues and customers; be able to work with diverse teams; negotiate and manage conflicts.
- Oral Communications – Articulate thoughts and ideas clearly and effectively; have public speaking skills.
- Ethics/Social Responsibility – Demonstrate integrity and ethical behavior; act responsibly with the interests of the larger community in mind.
- Critical Thinking/Problem Solving – Exercise sound reasoning and analytical thinking; use knowledge, facts, and data to solve workplace problems; apply math and science concepts to problem solving.

- Information Technology Application – Select and use appropriate technology to accomplish a given task, apply computing skills to problem solving.
- Written Communications – Write memos, letters, and complex technical reports clearly and effectively.
- Diversity – Learn from and work collaboratively with individuals representing diverse cultures, races, ages, genders, religions, lifestyles, and viewpoints.
- Lifelong Learning/Self Direction – Be able to continuously acquire new knowledge and skills; monitor one's own learning needs; be able to learn from one's mistakes.
- Creativity/Innovation* – Demonstrate originality and inventiveness in work; communicate new ideas to others; integrate knowledge across different disciplines.
- Leadership – Leverage the strengths of others to achieve common goals; use interpersonal skills to coach and develop others.

*projected to "increase in importance" for future workforce entrants

Emerging Content Areas

- Make appropriate choices concerning health and wellness, including nutrition, exercise, stress reduction, work-life effectiveness.
- Exercise personal financial responsibility, such as balancing a checkbook, budgeting skills, retirement planning.
- Use entrepreneurial skills to enhance workplace productivity and career options.
- Understand economic issues and the role of business in the U.S. and global economy.
- Demonstrate understanding of global markets and the economic and cultural effects of globalization.
- Participate effectively in community and government as an informed citizen.
- Use non-English languages as a tool for understanding other nations, markets, and cultures.

Key aspects of development and use

The definition reflects current thinking in the field, addressing content-area knowledge and explicitly using the Partnership for 21st Century Skills as a resource. The development process is extensively documented and includes the participation of U.S. businesses. Funders for the project include The Annie E. Casey Foundation (AECF), Dell Inc., The Ford Foundation, Microsoft, Pearson Education, Phillip Morris USA Youth Smoking Prevention, SAP, and State Farm. Employers of students who are graduates of high school, graduates of two-year colleges/technical schools, and graduates of four-year colleges were asked to rank the importance of each basic knowledge/skill, applied skill, and emerging content areas in order to establish which are most important to workforce success for entry-level workers with varying levels of education.

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Equipped for the Future (EFF) (National Institute for Literacy)

Term Defined: Workplace Readiness

Key Components of the Definition
The Equipped for the Future Content Standards define "the core knowledge and skills adults need to effectively carry out their roles as parents, citizens, and workers," and are categorized into four fundamental categories of skills:

- Communication Skills (read with understanding, convey ideas in writing, speak so others can understand, listen actively, observe critically)
- Decision-Making Skills (solve problems and make decisions, plan, use math to solve problems and communicate)
- Interpersonal Skills (cooperate with others, guide others, advocate and influence, resolve conflict and negotiate)
- Lifelong Learning Skills (take responsibility for learning, learn through research, reflect and evaluate, use information and communications technology).

The EFF Worker Road Map further details four broad areas of worker responsibility: Do the Work, Work With Others, Work Within the Big Picture, and Plan and Direct Personal and Professional Growth. Key Activities further define workplace readiness by indicating how, how well, and with what outcomes the broad areas of worker responsibility are performed.

Key aspects of development and use
The EFF Standards were created as part of the National Institute for Literacy's ten-year standards development initiative. They build on research conducted by the Secretary's Commission on Necessary Skills (SCANS) and respond to the National Research Council's findings in its 1999 report, *How People Learn: Brain, Mind, Experience, and School*, that:

> In the early part of the twentieth century, education focused on the acquisition of literacy skills: simple reading, writing, and calculating… Now, at the end of the century, these aspects of high literacy are required of almost everyone in order to negotiate successfully the complexities of contemporary life.

EFF standards form the basis of the National Work Readiness Credential (NWRC), which has further developed its workplace readiness definition through a national consensus-building process that included businesses, unions, chambers of commerce, education and training professionals, and state workforce investment boards, in which the National Work Readiness Council conducted an online survey and organized structured feedback sessions to obtain face-to-face reviews of tasks and skills. The NWRC "identifies the knowledge, skills, and abilities that supervisors, managers, and other workforce experts agree are most important when looking for people who can successfully perform entry-level work" using a "standards-based approach to defining,

measuring, and certifying work readiness." The NWRC Profile cross-references 10 EFF skills, under which are listed critical entry-level tasks, based on 10 SCANS categories.

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Secretary's Commission on Achieving Necessary Skills (SCANS)

Term defined: Workplace Know-How

Key components of the definition
SCANS establishes eight requirements essential for student workplace know-how that differ from technical or content knowledge and can be applied across workplace contexts.

The eight requirements are comprised of "five competencies and a three-part foundation of skills and personal qualities that are needed for solid job performance. [They] represent essential preparation for all students, both those going directly to work and those planning further education. All eight must be an integral part of every young person's school life."

Competencies (5)—effective workers can productively use:
- Resources - allocating time, money, materials, space, and staff;
- Interpersonal Skills - working on teams, teaching others, serving customers, leading, negotiating, and working well with people from culturally diverse backgrounds;
- Information - acquiring and evaluating data, organizing and maintaining files, interpreting and communicating, and using computers to process information;
- Systems - understanding social, organizational, and technological systems, monitoring and correcting performance, and designing or improving systems;
- Technology - selecting equipment and tools, applying technology to specific tasks, and maintaining and troubleshooting technologies.

The Foundation (3)—competence requires:
- Basic Skills - reading, writing, arithmetic and mathematics, speaking, and listening;
- Thinking Skills - thinking creatively, making decisions, solving problems, seeing things in the mind's eye, knowing how to learn, and reasoning;
- Personal Qualities - individual responsibility, self-esteem, sociability, self-management, and integrity.

Additionally, five scenarios of work environments from various sectors of the economy are presented to demonstrate the commonalities of the competencies and foundation skills in these jobs.

Key aspects of development and use
The SCANS report resulted from discussions and meetings with business owners, public employers, unions, and workers and supervisors in shops, plants, and stores. It builds on the work of six special panels established to examine all manner of jobs from manufacturing to government employment. Researchers were commissioned to conduct lengthy interviews with workers in a wide range of jobs, and focus groups were conducted with students.

The SCANS competencies and foundations were used in the development of the National Institute for Literacy's Equipped for the Future (EFF) Content Standards. The Work

Readiness Credential Profile, based upon EFF Content Standards and SCANS, groups its critical entry-level tasks "under headings based on 10 SCANS categories," because of their familiarity in the field of workforce preparation.

The definition was also reviewed in the development of the enGauge 21st Century Skills, the *Framework for 21st Century Learning* of the Partnership for 21st Century Skills, the 2005 Massachusetts Career-Development Education Guide's Work-Based Learning Plan, and the New Jersey Cross-Content Workplace Readiness Curriculum Framework. This indicates that while the report is not as recent as other considered definitions, the competencies and foundation skills contained within still provide relevant considerations for career/post secondary readiness.

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