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Career Cluster™ and Career Pathway Knowledge and Skills Statements

The Career ® Knowledge and Skills Statements were scheduled for review and revision in 2011 with public release of the revised statements in June 2012. The original body of work was initially completed a decade ago and has undergone revision efforts in 2006 and 2008. The most recent revision, 2008, focused primarily on consistency of format, organization and depth of knowledge expected in statements across each of the 16 Career Clusters®. From the outset, the 2011 revision process had three primary goals:

1. Ensure statements are aligned to current career expectations
2. Ensure the most complete representation of the spectrum of careers in each Career Cluster® and Career Pathway
3. Use lessons learned from the development of the Common Core State Standards for Mathematics and English Language Arts to support commonality and a rigorous approach.

The process initiated in early 2011 and included the following sequence of activities:

Develop an online platform to manage the statements and provide for collaborative review and revision. (January-February 2011)
The total collection of statements includes more than 5,000 statements in 16 Career Clusters® and 79 Career Pathways. An online platform with a robust database and user functionality was necessary to increase the number of people involved in the review and revision process, and to ensure utility of the statements across the increasingly diverse careers and industry segments within each Career Cluster® as no single industry group or committee is comprised of representatives that align with the Career Cluster® model. Metalogic was chosen as the partner for this task. Their product, Metacat, had been used successful for years by the Council of Chief State School Officers (CCSSO) for multiple State Collaboratives on Assessment and Student Standards (SCASS) groups and by individual states for curriculum and standards efforts. The migration of the statements within the online database was completed in February 2011 and functionality for review, revision validation and distribution was put in place.

Identify and invite Subject Matter Experts (SME) to review, rate, and comment on the 2008 version of the statements (February-March 2011)
In previous revision efforts Career Cluster National Advisory Committees (NAC) were tasked with convening and conducting the initial review and evaluation of the current statements. With the migration to an online platform an opportunity was available to open the review and rating process to any subject matter expert with interest to participate. This allowed participation in the process by a more broad, diverse and representative sample of career professionals for each of the Career Clusters®. The NACs were key partners in sharing the invitation and encouraging people in their professional networks to participate. Those participating created a profile, logged in to the site, and had the opportunity to rate each Knowledge and Skill Statement on its frequency, criticality and applicability. SMEs could comment on statements, suggest new statements, and comment on the collection as a whole.

Compile and analyze SME input (April-May 2011)
In total, 640 SMEs participated in the review of the statements, providing a total of 10,000 ratings and nearly 300 comments. These ratings and comments were compiled and an initial analysis was conducted to determine average ratings on indicators and common themes among feedback. This analysis yielded initial indications of the strengths and weaknesses of the existing collections of statements and provided insights into gaps and areas of obsolescence.

Conduct analysis of Common Core State Standards (CCSS) process and results and determine applications to Knowledge and Skill revision process (April-May 2011)
By April 2011, 45 states had adopted the Common Core State Standards (CCSS) for Mathematics and English Language Arts for their state standards in these areas. This widespread adoption was based, in part, on the perceived validity of the development process and the quality of the resulting standards. An analysis of the process used to develop the CCSS yielded a number of insights regarding sequence of activities, the people involved, and the criteria and tools provided. These insights shaped the design of the process and tools used in the Knowledge and Skills Statements revision process.

Identify benchmark standards (June-July 2011)
A goal of this revision process was to ensure that statements were benchmarked to applicable industry/professional standards including where applicable internationally-benchmarked resources. Industry and professional standards are typically identified for specific job roles and career specialties. In many Career Pathways, there were a number of related professional certifications that could be identified as benchmark standards. The nature of some career specialties and of some Career Pathways, however, is such that formal certifications or credentials do not exist. In these situations, alternatives were sought. These alternatives – professional development programs official job descriptions listing, required skills and expectations, postsecondary program of study/course objectives, standards developed by CTE-related associations with demonstrated industry involvement, and state CTE standards developed with significant involvement of employers and industry representatives – could serve the same purpose: to identify the benchmarks to which Knowledge and Skill Statements should be aligned. More than 500 sets of benchmark standards were identified across the 79 Career Pathways. These benchmark standards would be reviewed by the revision writing team and used to evaluate the relevance of each collection of the statements. A file with the listing of identified benchmark standards can be found at https://careertechorg.presencehost.net/file_download/d0270e28-a257-4991-9bc3-54a15a511ded.xls.

Develop criteria for quality statements. (July-August 2011)
The criteria for CCSS standards, used by working groups as a guide when creating and presenting new standards, provided the basis for the development of a similar set of criteria for the statements to ensure consistency and quality. The list of criteria can be found in Appendix A.

Identify and invite writing team members (August 2011)
A dedicated team of professional educators was required for the revision process. The previous revision efforts allowed for each of the 16 Career Clusters® to work independently and arrive at revisions for the statements. In order to drive consistent statements meeting newly establish criteria and aligned to benchmarked standards would require training, calibration and time not afforded by using volunteer committees. Writing team members had to have previous experience in standards development, a multi-discipline understanding of CTE, and excellent analysis and writing skills. Four writing team members were selected and trained for the task. Each writing team member would be responsible for leading the review and revision efforts on two to six Career Clusters®. A brief biography of each of the writing team members can be found in Appendix B.

Evaluate content, organization and presentation of the statements based on comprehensive analysis of SME input, benchmark standards, and criteria for quality statements. (September-October 2011)
The first phase of effort for writing team members was a review of existing analyses related to the statements in assigned Career Clusters®. Writing team members received the SME input and analysis, list of benchmark standards, and the criteria for Knowledge and Skill statements. A meta-analysis of these items provided the foundation of knowledge needed to bring a thoughtful and informed perspective in evaluating the 2008 version of the Knowledge and Skills Statements. Writing team members identified statements that may be obsolete, have inappropriate grain size, not have support from benchmark standards, or lack clarity. Writing

team members also identified gaps in the collection where new statements may be merited. After initial evaluation, writing team members shared initial findings with the team for peer-review feedback on proposed edits.

All of the writing team members were asked to evaluate the collection of Essential Knowledge and Skills Statements and provide their analysis of their effectiveness and recommendations for revision. All expressed concern regarding the quantity and redundancy of statements, and they suggested that the expectations expressed in these statements were behavioral, not content, based. The group looked to the Standards for Math Practice in the CCSS for Mathematics as a model for re-thinking the approach to these expectations. The Standards for Math Practice were identified as separate from the math content standards because they express expectations for how a student approaches the practice of mathematics – the behaviors needed to be successful in the mathematics domain. Nebraska Career Education had already used the Standards for Math Practice as a model for creating career readiness standards for every CTE student. Nebraska has used the Essential Knowledge and Skills Statements as the basis for this effort. The writing team reviewed the work from Nebraska and related projects in Texas, Virginia and other states. The team agreed with the approach and developed a draft of the Career Ready Standards to replace the Essential Knowledge and Skills Statements, and the related 10 topics that organized the statements. The Career Ready Standards are intended to serve as a companion set of practice standards to the revised statements. More information on the Career Ready Practices is provided below.

Make revisions to statements and review within writing team. (October-December 2011)
Once the initial evaluation was completed, writing team members used the online standards portal to make edits to the statements and related performance elements and sample indicators. The portal tracked each edit and maintained each previous version of the statement. With nearly 5,000 statements in the entire collection, maintaining version control was a critical element of the revision process.

Writing team members would indicate when initial edits were complete and the collection was ready for review by another writing team member. This redundancy provided quality assurance in both the content and presentation of the statements. These reviews focused on clarity, adherence to the criteria for statements, and rationale/support for changes to the content or scope of a statement. Upon initial review, writing team members made second round edits to the statements and prepared them for further review.

It is during this step in the process that the Knowledge and Skills Statements in the 2008 collections were affirmed, revised, consolidated or removed with the resulting statements comprising what would become the 2012 version of the collection. As with all standards writing and revision efforts, this was not an easy, clean process; numerous professional judgments were made, and confirmed, in an attempt to make the resulting statements more clear, more aligned to industry and international benchmarks, and more succinct (goals similar to those of the CCSS). The online database housing the statements contains a history of all the edits made in the 2008 collection to become the 2012 collection. This collection of edits numbers in the thousands and attempts to publish a summary that could easily summarize the changes from the 2008 collection to the 2012 collection resulted in reports that were unwieldy and without utility. Therefore, while a record of the edits exists in the database, it will likely be far more useful to compare the 2008 and 2012 statements side by side to discern the intent and manifestation of the edits made.

Engage Career Cluster® National Advisory Committees (as available) in review sessions of proposed revisions and make additional edits as needed. (December 2011)
The Career Cluster® National Advisory Committees were informed of the revision process prior to onset and invited to participate in the revision process at the level they desired. Four committees, Agriculture, Food & Natural Resources Systems; Information Technology, Transportation, Distribution & Logistics; and the Architecture & Construction Career Clusters® areas, chose to be involved in a review of the second draft

revisions. Revised statements were shared with committees to review, consider, and compile feedback. Committee feedback was used by writing team members to make additional edits to statements.

Engage editor in applying consistent style guidelines to statements. (January 2012)
By early January 2012, the writing team had completed all initial revision efforts and the statements were ready for editing for consistent presentation and style treatment. A copy editor reviewed all statements in the online portal and made additional edits. In cases where an edit may impact the meaning or content of a statement the copy editor engaged the writing team members to ensure the intent and technical accuracy of the statement was maintained.

Conduct public review and validation survey of revised statements using online platform inviting SMEs from initial review and other interested parties to participate. (January-February 2012)
In January 2012, the online portal hosted by Metalogic was again utilized to allow for review of the revised statements, indicate a rating, and provide comments. All users had to create registrations in the portal to provide ratings and comments. During the registration process, users were asked to identify their role, organization, years of related professional experience and Career Cluster(s)® of expertise. No personal information was collected (e.g., name, address, phone, age).

The validation questions used in this survey paralleled those used in the original validation process in 2002. This consistency in approach allowed for an initial measure of longitudinal analysis and comparison.

All of the users participating in the initial, collaborative review of the 2008 version of the Knowledge and Skills Statements, conducted in April-May 2011, were invited to participate in this review and validation. Additionally, invitations to participate in the review and validation exercise were shared with CTE State Directors, affiliated CTE and education organizations, professional and industry associations, and to the public via the Career Clusters® Web site.

Compile and analyze validation survey results and use to make additional revisions to the Knowledge and Skills Statements. (February 2012)
In total, 1,748 users participated in the review and validation survey of the Knowledge and Skills Statements, providing a total of 40,000 ratings and nearly 800comments. These ratings and comments were compiled and an analysis was conducted to determine validation ratings on the statements. The collection of comments yielded a number of minor suggestions to the statements – mostly wording, terminology, and other presentation issues. The writing team and editor reviewed each suggestion and made judgments regarding the need for additional edits. The analysis of the validation ratings yielded evidence that all of the proposed Knowledge and Skills Statements were perceived as frequent, critical and useful indicators. This step resulted in a final set of revised Knowledge and Skills Statements ready for use.

Present statements for use in the development of the Common Career Technical Core. (March 2012)
With the decision by states to create the Common Career Technical Core (CCTC) standards, it was determined that the revised Knowledge and Skill Statements would shift in role and purpose. The highest level of statements – the Knowledge and Skill Statement itself – would be presented as a starting point for the deliberations of each of the 16 technical working groups assembled to define the CCTC by Career Cluster® and Career Pathway. The remaining statements – the Performance Elements and Sample Indicators – would be reserved for use as supporting documentation for the resulting CCTC. It was recognized that the remaining collection of supporting statements may not align perfectly to the resulting CCTC standards, especially in cases where the CCTC technical working groups chose to create new CCTC standards not related to an existing statement, not use an existing statement as the basis for a CCTC standard, or greatly modify the intent or content of an existing statement in the development of a CCTC standard. The process for developing the CCTC standards is available in a separate technical report that outlined the process and steps taken for the development of the standards.

Prepare statements for use in support of implementing CCTC. (July 2012)
Upon approval of the CCTC standards in June 2012, the remaining Performance Elements and corresponding sample indicators were aligned, where available and appropriate, to each CCTC standard. The Performance Elements are not presented as an extension of the CCTC standards – these stand alone. Rather, the Performance

Elements are presented as one possible resource to help state and local entities identify the content and instructional objectives needed to meet the CCTC standards for given programs of study.

Interested parties can find the Performance Elements aligned to the CCTC by Career Cluster® at the website www.careerclusters.org. The site also has a link to the online portal where custom searches and reports for CCTC standards and aligned Performance Elements.

Essential Knowledge and Skills Statements into Career Ready Practices
The development of the Career Ready Practices had a significant impact on the revisions of the statements in two significant ways. First, the Career Ready Practices served as a framework to organize and consolidate dozens of Essential Knowledge and Skills Statements. These statements, created in the 2008, were an attempt to identify the common, essential career skills shared by all careers/Career Clusters®/Career Pathway. Prior to their creation, these general work-place skills had been found in each Career Cluster®. The Career Ready Practices replace the Essential Knowledge and Skills Statements. The statements that were previously part of the Essential Knowledge and Skills Statements are now found as part of the collection of Performance Elements; in this case, the statements now align to and support the Career Ready Practices. Again, the statements are not meant as an extension of the Career Ready Practices, rather a tool for state and local agencies to help inform instruction and assessment of the Career Ready Practices.

The second impact of the Career Ready Practices was that a substantial number of the statements in each Career Cluster®, ranging from 5-20% of statements at the Career Cluster®-level, could be removed since the scope and intent of the statement was duplicative of the scope and intent of one of the Career Ready Practices. This allowed for the remaining statements to be focused on technical aspects specific to the nature of that Career Cluster® and/or Career Pathway.

The Results of the 2011 Knowledge and Skills StatementsRevision Process
In summary, the revision process yielded a collection of statements that was fewer, more technically accurate and aligned to current expectations, more specific to its Career Cluster®/Career Pathway, and written to reflect the cognitive and technical complexity required for proficiency. It would be extremely difficult to prepare a side-by-side presentation of the 2008 and 2011 versions of the Knowledge and Skills Statements as the changes did not follow a one-to-one progression. However, it is safe to say that the vast majority of statements did not change greatly in scope, topic or intent. Approximately 15 percent of the statements were removed due to duplicity with Career Ready Practices, duplicity within a collection, or lack of evidence from SME review or alignment to benchmark standards to support its continued inclusion. Fewer than 2 percent of the statements were new in the 2011 version with most of those coming in areas of rapidly evolving technology or changes in the business: information technology, health sciences, and natural resources (energy) to name a few areas.

The final product of the 2011 revisions has been archived and will not be released publicly due to the adoption of the CCTC. As mentioned earlier, the 2011 version of the statements served as the starting point for the work of the CCTC technical working groups. The work of those groups builds upon and supplants the statements.

Appendix A **Common Core State Standards Initiative Standards - Setting Criteria** Source: http://corestandards.org/assets/Criteria.pdf	**National Career Clusters® Framework Knowledge and Skills Statements (Standards) Revision** **Standard-Setting Criteria - response** **September 2011**
The following criteria guided the standards development workgroups in setting the draft college and career readiness standards. ――――――― **Preamble:** The Common Core State Standards define the rigourous skills and knowledge in English Language Arts and Mathematics that need to be effectively taugh and learned for students to be ready to succeed academically in credit-bearing, college entry courses and in workforce training programs. These standards have been developed to be:	The following criteria guided the standards development workgroups in revising the National Career Clusters® Knowledge and Skills Statements (the Standards). "The Standards define the rigorous skills and knowledge in Career Clusters and Pathways that need to be effectively taught and learned for students to be ready to succeed in the early-carreer phase of high-skill, high wage, and high-demand careers."
1. Fewer, clearer, and higher, to best drive effective policy and practice;	
2. Aligned with college and work expectations. so that all students are prepared for success upon graduating from high school;	Same
3. Inclusive of rigorous content and applications of knowledge through higher-order skills, so that all students are prepared for the 21st century;	"…upon graduating high school and/or post-secondary program." Same
4. Internationally-benchmarked, so that all students so that all students are prepared for succeding in our global economy and society; and	
5. Research and evidence-based.	"Industry benchmarked (internationally where available), so that…"
The standards intend to set forward thinking goals for student performance based in evidence about what is required for success. The standards developed will set the stage for U.S. education not just beyond next year, but for the next decade, and they must ensure *all* American students are prepared for the global economic workplace. Futhermore, the standards created will not lower the bar but raise it for all students; as such, we cannot narrow the college-ready focus of the standards to just preparation of students for college algebra and English composition and therefore will seek to ensure all students are prepared for all entry-level, credit-bearing, academic college courses in English, mathematics, the sciences, the social sciences, and the humanities. The objective is for all students to enter these classes ready for success (defined for these purposes as a C or better) .	Same Same

Goal: The standards as a whole must be essential, rigorous, clear and specific, coherent, and internationally benchmarked.	"The standards nust be reasonable in scope in defining the knowledge and skills students should have to be ready for success in high-skill, high-wage, and high-demand careers.
Essential: The standards must be reasonable in scope in defining the knowledge and skills students should have to be ready to succeed in entry-level, credit-bearing, academic college courses and in workforce training programs.	Delete - defined in statement above
Wokforce Training Programs pertain to careers that: 1) Offer competitive, livable salaries above the poverty line 2) Offer opportunities for career advancement 3) Are in a growing or sustainable industry	
College refers to two- and four-year postsecondary schools	"Postsecondary refers to two- and four-year colleges, specialize career schools, military training programs and apprenticeships."
Entry-level, credit-bearing, academic college courses (e,g, English, mathematics, sciences, social sciences, humanities)	Delete - not part of definition
Rigorous: The standards will include high-level cognitive demands by asking students to demostrate deep conceptual understanding through the application of content knowledge and skills to new situations. High-level cognitive demand includes reasoning, justification, synthesis, analysis, and problem solving.	Same
Clear and Specific: The standards should provide sufficient guidance and clarity so that they are teachable, learnable, and measurable. The standards will also be clear and understandable to the general public. Quality standards are precise and provide sufficient detail to convey the level of performance expected without being overly prescriptive. (the "what" not the "how"). The standards should mantain a relatively consistent level of grain size.	Same
Teachable and learnable: Provide sufficient guidance for the deisgn of curricula and instuctional materials. The standards must be reasonable in scope, instructionally manageable, and promote depth of understrnading. The standards will not prescribe how they are taugh and learned but will allow teachers felexibility to teach students to learn in various instructionally relevant contexts.	Same

Measurable: Student attainment of the standards should be observable and verifiable and the standards can be used to develop broader assessment frameworks	Same
Coherent: The standards should convey a unifies vision of the big ideas and supporting concepts within a discipline and reflect a progression of learning that is meaningful and appropriate.	Same
Grade-by-grade standards: The standards will have limited repetion across the grades or grade spans to help educators allign instruction to the standards.	Delete - defined in statement above
Internationally benchmarked: The standards will be informed by the content, rigor, and organization of the standards of high-perfoming countries so that all students are prepared for succeeding in our global economy and society.	Industry benchmarked (internationally where available): The standards will be informed by the content, rigor, and organization of related industry and associations so that all the students are prepared for current, real-world expectations

Biographies of the Writing Team
2012 Revisions to Knowledge and Skills Statements

Elizabeth (Liz) M. Russell

Elizabeth (Liz) M. Russell, retired in July 2010 as State Director of Career and Technical Education of Virginia. She is a former board member of NASDCTEc. Still active in education, she serves as Co-chair for her local CTE Advisory Committee, does consulting work for local, state and national projects for CTE, and as a Supervising teacher for local student-teachers from Mary Baldwin College.

She received her Bachelor of Science and Master's of Education degrees from Virginia Commonwealth University. She also completed additional post-graduate studies in Administration and Supervision at James Madison University, Virginia Tech, and William and Mary College.

In addition to serving as State Director for CTE, her 33 years have included serving as a business teacher, local CTE director, principal of a Regional Technical Center and also of a combined Regional Governor's School and Technical Center, assistant principal at a comprehensive high school, and Virginia State Supervisor of Business and Information Technology. She has served on boards of several state and national professional organizations and as president of the Virginia Association of Career & Technical Education (VACTE), the Virginia Association of CTE Administrators (VACTEA), and Delta Phi Epsilon. She was recognized as Virginia's Outstanding Vocational Educator in 1998.

Reba S. Poulson

Reba Poulson is the former Perkins State Director for the State of Louisiana and is currently an Independent Consultant. Her educational background includes: a BA, Elementary Education, Virginia Union University, Richmond, VA; an MPA, Western Michigan University, Kalamazoo Michigan; and is a Doctoral Candidate in Higher Education Administration, University of Alabama, Tuscaloosa. Positions held include: Elementary Teacher Richmond, Virginia; several positions at Kalamazoo Valley Community College--Reading and Study Skills Specialist, Disabilities Coordinator, Learning Center Manager, Director, Project Focus; Federal Programs Coordinator, Louisiana Board of Regents; Project Administrator, Louis Stokes Alliance for Minority Participation, Southern University, Baton Rouge; Postsecondary Perkins Coordinator, LCTCS; and State Director, Perkins CTE Programs, LCTCS. Board Memberships: past board member, National Association of State Directors of Career and Technical Education, Multi-State Academic & Vocational Curriculum Consortium (MAVCC), and current board member, Center for Occupational Research and Development (CORD).

She also was a member of the Board of Regents Advisory Committee; the Board of Regents Task Force to review the education/workforce needs of central Louisiana, participated in the writing of the Perkins III state plan and served led the state plan efforts for Perkins IV. As an active participant with the State Directors organization, she co-chaired the Career Clusters Committee and was an active participant in the development of the new vision for career and technical education. She coached the Northeast Louisiana Technical College in the development of the Information Technology Career Cluster. Ms. Poulson has worked with grant-writing teams to develop proposals for submission to the US Department of Education (FIPSE, Title III), National Science Foundation, Department of Defense, Board of Regents, and several US Department of Labor proposals.

Melissa Briscoe

Melissa Briscoe is currently retired from the Kentucky Department of Education but continues to work on numerous curriculum projects for various states and national organizations. She began her tenure in curriculum work leading a statewide effort in competency based education for technical programs, became Director of Curriculum for K-12 at the state level and retired as the Associate Superintendent of Career and Technical Education for Secondary Programs. She served on the board for High Schools that Work at the Southern Regional Education Board and on the Vocational Technical Education Consortium of States Board (now CTECS) and assisted in the applied academic efforts with the Center for Occupational Research.

Since retirement she has conducted numerous workshops at the University of Louisville to help teachers develop curriculum for the Integration of Academics in both academic and career and technical programs.   She has also worked on numerous standards projects for the Career and Technical Education Consortium of States along with assessment projects associated with the cluster standards in Manufacturing for Kentucky and in Business Management & Administration, Finance and Marketing for the national student organization of FBLA (Future Business Leaders of America). She served as the coordinator of the nine pilot sites for the first Arts, Audio/Video Technology & Communications Career Cluster project, assisted with the Business Management & Administration Career Cluster development effort, and with the Consumer and Family Life Skills Standards Project, a forerunner to the Human Services Career Cluster work.

During the past eight years, Melissa has been working with Fran Beauman and the Illinois Office of Educational Services to assist teachers in the development of curriculum based on the Transportation, Distribution and Logistics Career Cluster standards and integration of academics.   This work has been extended thru a project sponsored by the US Department of Transportation in Illinois and several other states. As a pioneer in the initial projects, Melissa has a strong interest in providing knowledge and skills that can be implemented by the classroom teacher while meeting the needs of today's businesses and industries.

Seth Derner

Seth Derner is a professional development consultant for the States' Career Clusters Initiative - an initiative established under the National Career Technical Education Foundation (NCTEF) to provide Career Clusters™ as a tool to facilitate a new vision for CTE and the reinvention of American schools. Seth brings a practical, real-world approach to standards, program of study, and curriculum design. He draws from his experience as a secondary CTE teacher, program manager for a national career and technical student organization, and director of FutureForce Nebraska – an organization designed to facilitate partnerships between education, workforce development and economic development.

Seth is president and development leader for Vivayic - a firm specializing in human capital development through the design of effective learning solutions. Seth co-authored the books, "Strategies for Great Teaching" and "Strategies to Integrate NOW: Academics in Career and Technical Education." Seth was project manager of the 2008 revision efforts of the National Career Clusters Knowledge and Skill Statements.