SREB

Recognizing Academic Achievement in Career/Technical Education

Conditions for Awarding Academic Credit for Career/Technical Courses

HIGH SCHOOLS THAT WORK

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Recognizing Academic Achievement in Career/Technical Education

Foreword

During the 30 years since the U.S. Department of Education's landmark report, *A Nation at Risk*, exclaimed the urgent need to reform our public school systems, we have worked fervently to strengthen the high school curricula and raise the level of expectations for all students. Yet, we have not seen a big enough payoff from these efforts. As a nation, we have not regained the top position among industrialized countries in achievement and graduation rates. About a fourth of our nation's high school students do not graduate. While we have increased the number of academic credits and higher-level academic courses required for graduation, we have not experienced a corresponding rise in academic achievement. Too many students are unprepared for the rigor of postsecondary study. We have high dropout rates because too few students are engaged in meaningful and rigorous learning.

To reach the regional goals for 2020 adopted by the SREB Board of having 90 percent of students graduate from high school in four years and having 80 percent graduate ready for college and careers, we must move beyond a "one size fits all" approach in getting them prepared. We need to create optional pathways through which students can acquire college-ready academic skills, as well as work-ready academic, technical and employability skills.

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Currently the primary approach states use to achieve these goals is to beef up curricula by requiring more high-level traditional academic courses in English, mathematics, science, social studies and foreign languages. This single approach results in many students receiving a diet of weak academic courses that fail to engage them emotionally and intellectually in learning. Thus, many students leave high school prepared neither for college nor careers.

An SREB Board commission chaired by former Georgia Governor Sonny Perdue favored creating optional pathways that enable students to acquire cognitive, academic, and technical knowledge and skills, plus the habits and behaviors that make for successful students, employees and citizens. In its report, *The Next Generation of School Accountability: A Blueprint for Raising High School Achievement and Graduation Rates in SREB States*, SREB called for breaking down the barrier between traditional academic courses and career/technical education (CTE) to add value to learning and other college- and career-ready skills through authentic problems, projects and activities that are meaningful to students.

Learning in context naturally helps students build their ability to transfer skills to new situations, and to deepen their understanding of academic knowledge. Career/technical (CT) course work that

requires problem definition, research interpretation, testing of problem solutions and communication advances students' cognitive and higher-level academic skills. Students who report having at least four of the following eight experiences in their CT studies are credited with having rigorous learning experiences.

- Develop a logical argument for a solution to a problem or project.
- Make inferences from information provided to develop a solution for a problem or project.
- Use math to solve complex problems related to their CT area.
- Apply academic knowledge and skills to their CT area.
- Apply technical knowledge and skills to new situations.
- Develop and test hypotheses.
- Complete an extended project that requires planning, developing a solution for a defined problem that can be tested and presenting the results orally or in writing.
- Predict outcomes based on observations or information.

In 2010 and 2012, SREB's *High Schools That Work* found solid evidence that about a third of CT students experienced at least four of these rigorous learning experiences in their CT classes. When these students were compared with CT students who did not have such rich learning experiences in their CT classes but were similar demographically — parent education level, gender and race, — 15 percent to 25 percent more students with rigorous CT learning experiences met college- and career-readiness standards.[1] Challenging and rigorous learning experiences can be achieved in CT courses in three ways. The **first** is to recognize the value being added to college readiness by some of the existing high school CT courses within a pathway program of study.

The **second** way is to design a sequence of new CT courses in a high-demand, high-skill, high-wage career field. Texas can serve as an example. It has created a number of hybrid CT courses that can fulfill the academic requirement for the fourth math and/or science courses while advancing students work-ready academic, technical and employability skills. **Another example is SREB's *Preparation for Tomorrow (PFT)* multi-state collaborative to develop sequences of at least four rigorous CT courses in high-demand, high-skill and high-wage career fields that purposefully embed the Common Core State Standards or other rigorous state college- and career-ready standards in reading, mathematics and science**. This design approach blends the learning of academic, technical and habits of behavior and mind around authentic real-world problems and projects.

The *PFT* design calls for students to take end-of-course exams to assess their depth of learning around common core literacy, math and science standards as well as technical content. These exams will provide evidence of whether students have acquired sufficient academic learning in these four courses to be awarded one or more academic credits.

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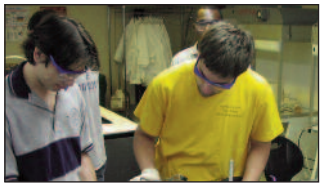
[1] Special analyses of the 2010 and 2012 *High Schools That Work* Assessments.

The **third** way is to redesign current CT courses in high-demand, high-skill, high-wage career fields. This can be done by transforming existing CT courses and creating courses that represent a blend of academic and technical skills aimed at advancing both college- and career-readiness. Regardless of configuration or the ways in which CT courses are designed, the bottom line should be: if students can attain an equivalent level of academic knowledge and skills in rigorous CT course work, then we ought to recognize that learning through academic credit.



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In developing this report, we drew from ideas that emerged from an SREB forum of policy-makers and state leaders from 18 states who convened to look at conditions under which states can recognize academic learning occurring in CT course work. In addition, we surveyed existing policies in SREB states for awarding academic credit through CT studies. This report highlights a set of recommendations that will help policy-makers continue to shape and refine policies for designing CT courses for awarding academic credit. Implementing these recommendations will enable more students to graduate from high school with a career credential and ready to pursue advanced training, an associate's degree or bachelor's degree.

First, this is prudent policy. Until we have a solid base of research for what rigorous or redesigned CT courses should look like to add significant value to college- and work-ready achievement, **it is recommended that states limit the number of academic credits awarded through CT course work to no more than two or three**.

Second, we recommend avoiding a wholesale approval of a set of CT courses — i.e., any animal science course for biology, computer-aided drafting for geometry, etc., — unless such courses have been redesigned and reviewed through a state review process that includes academic educators, CT educators and higher education faculty. Such a review process should clearly find solid evidence of embedded academic standards and cognitive development at a level sufficient for awarding college- and career-ready academic credit. The individuals who teach such courses must be adequately prepared to do so. In most cases, there will not be a one-on-one match of a CT course to a given academic course. However, a sufficient amount of academic and essential cognitive learning required for an academic credit could occur over two or three CT courses. Further, states may elect to award academic credit for hybrid CT courses. Texas has done this for senior-level courses specifically designed to include a blended curriculum involving math, science, technical content and technology that may count as a fourth math or science credit.

Third, it is recommended that CT teachers be well prepared through teacher preparation programs and/or in-service training to teach course work aligned with rigorous Common Core State Standards through authentic projects using rigorous assignments designed to advance students' ability to define problems and to successfully apply problem-solving structures for addressing problems.

Fourth, once a CT course or series of CT courses have been approved for awarding academic credits, it is recommended that states invest in a process to validate that expected learning has in fact occurred. If it is not possible to collect such data on all courses, a sample could serve to validate learning and support awarding academic credit. Such a process will provide valuable insights for actions needed to continually improve CT rigor and authentic learning experiences that impact student learning.

Fifth, awarding academic credit is a policy mechanism for recognizing student academic and cognitive development through CT course work. It is recommended that states have a reapproval process for ongoing assessment of the effectiveness of CT courses approved for academic credit. The process needs to require state staff and an external panel of postsecondary and industry representatives to study submitted material to validate rigor and make recommendations for improvements.

Sixth, when states delegate authority to local districts for awarding academic credit through CT course work, it is recommended they provide guidance for a review process for CT courses potentially eligible for academic credit. The intent of the review process is to verify that: a) the course has sufficient embedded academic content; b) the teacher has the academic skills needed for teaching the course; c) and the academic and cognitive learning in the course is at least equivalent to that found in the traditional academic course.

Summary. Putting in place the right set of policies for awarding academic credit for CT courses is one way to recognize CT programs with signature features that truly advance students' technical, academic and cognitive skills development. It is our hope that this report will assist states in their continuing efforts to develop rigorous optional pathways designed around authentic learning experiences that will result in more students graduating from high school and graduating both college- and career-ready.

Gene Bottoms
SREB Senior Vice President

Conditions for Awarding Academic Credit for Career/Technical Courses

To meet the dual goals of improving graduation rates *and* graduating more students college- and career-ready, states are searching for a set of policies and practices for optional rigorous pathways for success. One option under consideration is how to better blend intellectually demanding career/technical (CT) pathway courses with Common Core State Standards or other rigorous standards that result in more students being successful in traditional academic courses and in students earning academic credit through selected CT courses. Thus, states are exploring options that would broaden the concept of rigor from just a narrow focus on traditional academic courses and test-based rigor to one that would expand students' access to rigorous CT courses that have been properly tested for providing an alternative way to motivate them to make a greater effort to become college- and career-ready. The question becomes: **Are there CT courses[2] that address the same rigorous academic content standards as those found in traditional academic courses?**

In the future, redesigned CT courses must purposefully build on the Common Core State Standards for college- and career-readiness in literacy and mathematics. Two decades of SREB's *High Schools That Work* (*HSTW*) research provides strong evidence that intellectually demanding CT courses embedded with rigorous academic standards add value to academic achievement and improve students' readiness for college and careers. Thus, as states implement the Common Core State Standards, it is fundamentally important that they establish a process for redesigning CT courses around authentic projects with a solid foundation in Common Core State Standards in literacy and mathematics.

SREB's 2010 State Leaders' Forum in Charleston, South Carolina convened nearly 70 leaders from 18 states to address the contributions CT courses could make to improving student readiness for college and careers and raising graduation rates. This group included state legislators, members of state boards of education, state directors of CT education, and other secondary and postsecondary leaders, all focused on determining how CT course work can provide learning experiences that add value to students' academic achievement. Those present recognized that well-designed, project-based learning with purposefully taught embedded academic standards would provide students with another avenue for mastering academic standards. Thus, **if students can attain the same level of academic knowledge and skills in a CT course, should this different platform for learning academics yield academic credit?** As educators and policy-makers evaluate the merits of awarding academic credit for CT course work, they will need to consider policies, procedures and assessments that will engender confidence that

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[2] For consistency, this report uses "career/technical (CT)" to signify all career/technical courses and programs, even though some states identify these as career and technical education (CTE).

academic learning through CT courses meets high school graduation requirements and college- and career-readiness standards. **The purpose of this report is to inform state leaders about some of the conditions that need to be in place — and the obstacles to overcome — before moving forward to award academic credit for CT course work.**

Rationale for Awarding Academic Credit

States' efforts to set more rigorous graduation requirements to ensure more students are ready for college and careers have unintentionally created some dilemmas. For example, the notion that completing more rigorous academic courses results in higher achievement and deeper learning may be true for those students who are motivated by the traditional academic approach to learning. However, for those students who learn best through a mind-on and hands-on approach, the hefty load of traditional academic courses has only led to disengagement from school and learning and has often resulted in their enrollment in lower-level academic courses that are boring and intellectually bankrupt.

Even with more rigorous graduation requirements, there is substantial room for improvement in achievement. ACT Inc. reports that 25 percent of the ACT-tested students in the high school class of 2011 met the four ACT College Readiness Benchmarks (English, math, reading and science). Nearly 30 percent of the test-takers did not meet any of the benchmarks, and 15 percent met only one. Thus, too many high school students lack many of the skills needed to succeed in credit-bearing college courses, to pass employer certification exams and to complete more demanding workforce-training programs successfully.

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Another unfortunate side effect of increased graduation requirements is decreased time for students to participate in elective courses, including a planned concentration of at least four CT courses. Research on improving student outcomes stresses the importance of keeping students engaged in learning through instruction that is rigorous and relevant to them and their goals (Plank, DeLuca and Estacion, 2005; Oakes and Saunders, 2008; Stone, Alfeld and Pearson, 2008; and Bottoms, Han and Young, 2011). For many students, this means course work that involves their hands and minds — courses that require them to analyze complex texts and technical materials and to use knowledge and skills from math and science to complete challenging, authentic, real-world problems and projects.

In 2007, Grubb and Oakes reported that across states there is no lack of state standards, even high standards, for academic learning; yet, too many students graduate from high school unprepared for the next step. Grubb and Oakes concluded the problem is many students simply do not know how to apply their learning. They called for a balance between increasing academic rigor and providing relevant, well-developed and intellectually demanding career-focused courses that engage students in using academic knowledge and skills to complete authentic tasks. The Carnegie-IAS Commission on Mathematics and Science Education reported similar findings. Its report, *The Opportunity Equation*, suggests that course-based rigor is not sufficient, stating that the nation "cannot make the necessary improvements to mathematics and science education by focusing exclusively on mathematics and science learning."

The National Research Council's *Committee on Highly Successful Schools or Programs for K-12 STEM Education* analyzed criteria for effective STEM (science, technology, engineering and mathematics) education. Results from this study provide evidence of what can drive interest and success in math and science learning: Students are more likely to develop an interest and succeed in STEM learning when they have experiences that engage them in the practices of math and science and sustain their interest through opportunities to solve real-world problems, design engineering projects, carry out scientific investigations, and visit worksites or complete internships. However, more teachers need increased content knowledge and skills to provide authentic, project-based learning experiences that integrate academic and technical studies into relevant assignments.

CT courses that engage students in hands-on, mind-on learning can inspire more students to tackle and master challenging courses.

The best CT courses are built around problem-/project-based learning, an instructional platform shown to provide students with opportunities for critical thinking, problem solving, teamwork and application of academic knowledge to new situations — skills that are essential for lifelong learning (Massa, 2008). Findings from a recent experimental study of a project-based economics curriculum conducted by the National Center for Education Evaluation and Regional Assistance, in which students and teachers were randomly assigned to either the project-based or traditional course, provide strong evidence in support of developing CT courses that yield academic credit. Students in the project-based economics courses made greater gains in content knowledge and exhibited greater skill in problem-solving compared with students in the traditional economics course, indicating that problem/project-based learning has the power to promote not only CT but also academic learning.

CT courses that engage students in hands-on, mind-on learning can inspire more students to tackle and master challenging courses (Bottoms, Young and Han, 2009). Most importantly, CT courses with embedded academic college-readiness standards in reading, writing, math and science — equivalent to those found in traditional academic courses — provide students a different construct for learning that can deepen their understanding and retention of academic content. Thus, **it seems logical to recognize the academic learning that occurs in courses purposefully designed to provide contextualized learning of academics through authentic, real-world problems and projects**.

Obstacles to Awarding Academic Credit for CT Course Work

Educators underscore the need for guidance in awarding academic credit before unlocking a Pandora's Box of potentially valueless credits. During forum discussions, some policy-makers and state educational leaders admitted that their states do not have a well-developed way to award such credit; yet, they feel pressured to do so. Their overriding concern is that the movement toward awarding academic credit through CT course work is considered a "quick fix" for addressing the dropout problem and for improving graduation rates. Nonetheless, students who do not see sufficient relevance in traditional academic courses still need to master essential literacy, math and science concepts — the tools necessary for entering and advancing in postsecondary studies, training and careers. Many more students would be motivated to remain in high school and graduate college- and career-ready if they had a different approach to learning. Thus, this movement can serve as a valuable tool in helping states ensure more students graduate from high school.

The chief dilemma is that if there is no assurance that the academic course and CT course are comparable in both academic standards and student learning, then the award of such credit is unmerited. It simply would provide an easy way out for students who do not want to take rigorous courses. Moreover, it would provide districts and schools with a way to opt out of holding the more challenging students to high standards. Either scenario could lead to a separate track for learning — one not joined with a college-ready academic core.

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Forum participants raised the question, **"Does a single CT course or a combination of CT courses cover enough academic standards to justify awarding an academic credit?"** The general misconception is that an academic course and a CT course can be matched on a course-to-course basis. The best CT courses are designed around problems and projects that students would complete in a real-world setting. It is rare for such course work to draw solely from a single math course such as Algebra I or geometry. Instead, CT courses include a broad spectrum of concepts from various math courses, creating a challenge in measuring whether enough academic standards have been mastered to warrant awarding an academic credit. Furthermore, while it is possible for a sequence of three or four CT courses to encompass sufficient standards for the awarding of a full or partial academic credit, some students may not complete the entire sequence of CT courses and thus may find themselves short an academic credit at graduation time. To minimize this risk, states would need to create a "safety net," establishing ways for academic and CT teachers to work together to provide instruction so that students could master the missed standards and earn needed credits.

Validation of students' academic learning in a CT course is another challenge. If students are able to earn academic credit through CT courses, states will need a way to document that the desired learning occurred. A common assessment — such as the end-of-course exam for an equivalent academic course — is one way to determine if the academic achievement accomplished in the CT course is indeed comparable to achievement in the traditional academic course. Otherwise, states and districts will be left to ask, as one forum participant noted, "How will we know?"

Too often, **curricular materials for CT courses with embedded academics are limited in scope.** Even when states require a course syllabus and instructional materials for CT courses, these often are mere listings of academic standards. Forum participants emphasized the need to design instructional units and lesson plans with enabling learning activities and classroom assessments to ensure the teaching of those embedded academic standards.

Teacher certification is also a challenge for states. Policy leaders recognize that as their states move toward awarding academic credit for CT courses, they are struggling to determine how to meet the *No Child Left Behind* (*NCLB*) requirements for highly qualified teachers to teach the academic content encompassed in these evolving CT courses. Historically, CT courses have not been designed specifically to provide an alternative way for students to master college-ready core academic standards. Their purpose has been to provide students with the technical knowledge and skills needed to enter into a specific occupation or broad career field. Even if CT courses were developed around real-world problems and projects embedded with college- and career-readiness academic standards,

many CT teachers do not have the academic background to qualify as highly qualified teachers for academic content as required by *NCLB*. Many also lack the pedagogical skills to deliver the project-based instruction required in such redesigned CT courses. Overcoming this challenge will require staff development for CT teachers.

Transferability of academic credit earned through CT is a potential problem for students, especially students intending to play college sports. The National Collegiate Athletic Association (NCAA) is rigid in its interpretation of high school transcripts for student athletes. A forum participant reported that the "CT course must be posted on the high school transcript as an academic course for NCAA to recognize it. If it doesn't say 'geometry,' there's a problem." Tennessee participants shared how some schools in their state were able to convince the NCAA to accept Principles of Technology I and II as a physics credit. The NCAA would accept the CT course as a physics credit only if the student who took the course passed the end-of-course exam for physics. The difficulty is that each school — not the state — must apply for NCAA approval of such credits.

Similar problems with credit transfer can occur when colleges and universities will not accept academic credits earned through CT courses. Postsecondary institutions are reluctant to acknowledge such credits for college entrance because they are skeptical that the level of academic learning in the academic and CT course is comparable. Transportability of credit from school to school, district to district and state to state can also be a problem for students. **The bottom line is that academic credits earned through CT courses are not credible to all keepers of high school transcripts.** Gaining widespread recognition of academic credits earned through CT courses is a major obstacle.

Lastly, forum participants pointed to the differences in states based on who has the authority to set policy. **State-driven versus locally controlled polices** for awarding academic credit for CT courses create issues for some states. Even so, state leaders believe that it is important to provide guidance for awarding academic credit for CT courses.

How SREB States Stand in Awarding Academic Credit for CT Courses

Drawing from its work with states to improve CT education, SREB developed a set of criteria to use in studying policies that address awarding academic credit for CT courses in the 16 SREB states.[3] The study sought to answer four broad questions:

1. How do states develop and approve such courses?
2. How do states ensure that CT teachers have the knowledge and skills necessary to teach the full range of content required for students to earn full or partial academic credit through CT courses?

[3] SREB has 16 member states: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia. Information for this analysis is based on policies gathered in 2010-2011 from state websites, surveys of state career/technical directors and follow-up telephone calls and emails with state department of education officials. This report reflects policies and state leaders at that time.

3. How do states ensure that academic content taught through CT courses represents comparable standards taught in college-preparatory academic courses?

4. How do states review and approve or reapprove CT courses for the award of academic credit?

The resulting snapshot of where SREB states stand reveals a wide range of state policies in support of such credit. **While 11 of 16 SREB states have some policies pertinent to awarding academic credit for CT courses, no state has a comprehensive policy framework that fully addresses all of the relevant issues.** (See Appendix A through E.) Still, no matter how diverse or rudimentary, the existing policies can serve as a starting point for policy-makers as they develop valid and reliable ways to award academic credit through CT courses.

Policy to Award Academic Credit

States vary widely in the type and the number of CT courses through which students can earn academic credit. They also vary in whether such courses satisfy academic requirements for post-secondary admission and if such courses count as both an academic credit required for graduation *and* a credit toward CT program completion.

Two models emerge when examining the types of CT courses states have approved for academic credit. The **first recognizes CT courses as being equivalent to their traditional academic counterpart** in that they encompass comparable academic standards and learning — one mirrors the other in content but is taught in a different way. The **second model evaluates CT courses based on the level of rigor expected in a higher-level academic course.** These courses have sufficient rigor that they can take the place of the fourth mathematics, science, social studies or English/language arts credit but do not necessarily mirror any one specific academic course. Regardless of model, the alignment analysis determines whether there are sufficient academic standards in literacy, math or science embedded in the CT course to warrant an academic credit and whether the credit will count for high school graduation only or meet the college-ready academic core requirements for postsecondary admission.

The approaches in North Carolina and Tennessee fit the equivalent model. Their students can earn one physics credit by successfully completing both Principles of Technology I (PTI) and Principles of Technology II (PTII).[4] In other words, both states judge that there is a sufficient number of academic science standards in these two CT courses combined matching those in the traditional academic physics course. The university systems in both states currently accept this physics credit

[4] Principles of Technology I and II, designed by Center for Occupational Research and Development (CORD) and Agency for Instructional Technology (AIT), teach traditional physics concepts in the context of their relationship to four energy systems — mechanical, fluid, electrical and thermal. The curriculum focuses on the study of forces and laws of nature and includes the study of the following concepts and their application to modern technology: force, work, rate, resistance, energy, power, force transformers, momentum, waves and vibrations, energy converters, transducers, radiation, light and optical systems, and time constants. Demonstrations, mathematics labs and applied laboratory experiments are an integral part of the 14-unit Principles of Technology curriculum. These courses enable students to gain a solid foundation for careers in electronics, robotics, telecommunications and other technological fields.

for admissions. Students completing only Principles of Technology I can earn a physical science credit required for high school graduation in North Carolina.

Louisiana and Texas follow the second model, evaluating CT courses to confirm that they indeed are comparable in the level of rigor expected for the fourth mathematics, science or other subject credit required for graduation and/or postsecondary admission.

States vary widely in the type and the number of CT courses through which students can earn academic credit.

The Louisiana Board of Elementary and Secondary Education (BESE) and the board of regents have approved a large number of industry-based certification-related (IBC) courses that students completing a CT area of concentration may substitute for the fourth credit in science or social studies or the one art credit required in the new *Louisiana Core 4 Curriculum* for high school graduation with the college and career diploma. Many of these IBC courses (e.g., marketing management, Medical Assistant II, and routers and routing basics) are in the career areas of business, health science and information technology. These courses lead to an industry certification and meet the minimum admissions standards to the state's public four-year universities. Students in Louisiana also can fulfill the fourth math credit with a BESE-approved, locally developed math elective. A department of education official reported that few schools have undertaken the development of such courses because they do not satisfy the college-prep course requirements for the state's Taylor Opportunity Program for Students (TOPS) scholarship awards.

In Texas, high school students can earn two academic credits through CT — one fulfilling the fourth math credit and the other counting as the fourth science credit. When Texas recently reviewed and redesigned its CT courses to increase rigor and to meet college-readiness standards, the Texas State Board of Education approved a small subset of these to satisfy the fourth math or science credit.

The approach in Alabama fits both models by offering embedded and substitute credit for science and math through CT courses. Substitute credit is as its name implies — the CT course substitutes for the academic course. For example, the agriscience course plant biotechnology is a substitute for botany, a science course. **To qualify for an academic math or science credit through the embedded option, CT courses must provide a minimum of 140 clock hours of academic instruction, but this can be from a combination of at least two approved CT courses.**

Legislation recently enacted in Georgia established guidelines for awarding academic credit for CT courses embedded with academics and approved or adopted by the state board. **The guidelines allow students to earn both a CT credit and an academic credit for such courses, but the credit can count only once toward high school diploma requirements unless it includes expanded time to cover the academic and technical content.** The guidelines also limit the number of academic credits earned through CT courses to three and ensure acceptance of such credits for purposes of admission into a postsecondary institution.

Delaware and Maryland do not have any state policy for awarding academic credit for CT courses, but rather leave this decision for local districts. Thus, students in these two states may be able to earn academic credit through CT courses, based on local district policy.

20-2-159.3 (d) Students who successfully complete a course in career, technical, and agricultural education that includes embedded standards in academic core subject areas, as adopted or approved by the state board, shall receive course credit for both the career, technical, and agricultural education course as well as for the academic core coursework embedded in such course.

(e) The guidelines shall limit the number of academic credits earned through career, technical, and agricultural education courses for any student to three credits and shall ensure acceptance of such credits for purpose of admission into a postsecondary institution. Further, such a credit shall count only once toward high school diploma requirements unless the course required expanded time to cover the academic and career, technical and agricultural education content found in both the academic and the career, technical, and agricultural education course.

House Bill 186, Georgia General Assembly, 2011-2012 Regular Session, effective May 13, 2011

Developing and Approving CT Courses for Academic Credit

SREB established several criteria to use in this analysis of policies and processes that states use to develop and approve CT courses eligible for academic credit for high school graduation and/or postsecondary admissions requirements. Some criteria focus on academic and technical college- and career-readiness standards and the coverage of academic standards needed to warrant credit. Others center on instructional materials and methodology, assessments and grading systems. The desired outcome of having a process built on these criteria is assurance that the course does indeed provide equivalent academic learning through embedded Common Core State Standards[5] or other rigorous standards to what would be acquired through a traditional college-ready academic course.

Eleven SREB states allow CT courses to substitute for academic credits and have policy partially or fully outlining a process for the development and approval of CT courses. (See Appendix B.) In some instances, course approval is not singularly addressed but handled during program approval/reapproval. However, all policies allowing the award of academic credit for CT courses speak to the alignment of CT content with state grade-level academic standards and/or rigorous college- and career-readiness standards. The intent is to identify which grade-level and/or college- and career-readiness academic standards are essential to CT courses and then to determine if a sufficient number is embedded to warrant academic credit.

Oklahoma, for example, has a well-defined process for approving courses for academic credit and toward meeting the graduation requirements. The state board of education approves such courses if they integrate an appropriate set of competencies spelled out in Oklahoma's state academic standards (Priority Academic Student Skills) and provide for the teaching and learning of those skills. **For such courses to count toward Oklahoma's college-ready/work-ready curriculum requirements for college admissions, the CT teacher must hold an Oklahoma certification in the academic subject.**

[5] Fourteen SREB states have adopted the new Common Core State Standards for English Language Arts and Mathematics — http://www.corestandards.org/in-the-states.

Otherwise, the courses would meet the core curriculum requirements for high school graduation only. According to the state's director of CT education, these courses encompass college- and career-readiness standards and have course syllabi and related materials that include descriptions of the courses, the instructional delivery system, formative assessments and the grading system.

The *Florida Career and Professional Education Act of 2007* focused on improving the state's CT education programs and set the stage for awarding academic credit for CT courses. The policy established a curriculum review committee, comprised of representatives from education and industry, to review existing and proposed secondary CT courses to be considered as core courses. The intent was to ensure that the courses provided sufficient rigor and relevance for workforce skills and postsecondary education and that the courses were aligned to state curriculum standards. A panel of experts must verify CT courses yielding academic credit for math, science or other content areas. Such courses must be aligned to Florida's Next Generation Sunshine State Standards and clearly address academic content standards. The review process also ensures that the curricular materials contain well-developed lesson plans, teacher assignments and end-of-grading-period exams, and that they are taught by a CT teacher with adequate content knowledge and preparation for teaching.

The process for approving CT courses for academic credit in many states seems to stop with alignment. Identification of a *sufficient* number of academic standards that can be taught through the courses becomes the basis for awarding credit, **but SREB's analysis did not find any hard and fast rule for how much alignment is enough. Unfortunately, alignment alone cannot determine whether courses are taught to those standards.** Additional action is needed to approve lesson plans, assignments, assessments and training of teachers to ensure that the standards embedded in the courses are actually taught and that students master them.

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Less than half of the states awarding academic credit for CT courses address assessments and a grading system in their process. Only two states Oklahoma and Tennessee — specifically identify project-/problem-based learning as an instructional strategy required for awarding academic credit. For instance, the Tennessee State Board of Education (TBOE) addresses active learning in its policy for high school reform and calls for schools to design curricula and implement instruction — in both academic and technical courses — in ways that encourage students to participate in their own learning. According to TBOE, one implication of this policy is that statewide, high schools will implement applied academic courses using hands-on active learning strategies that focus on application of academic content and skills to real-world situations.

Only two states — Alabama and Texas — make sure the CT course title carries the same course title as the academic course on students' transcripts, which facilitates a seamless transfer of credit. Moreover, states fall short in providing ways to ensure the coverage of academic standards in the CT courses — through developed lessons, student assignments and classroom assessments — warrants an academic credit. **Most often, a one-for-one match of an academic course to a CT course does not exist.**

Teaching CT Courses Yielding Academic Credit

SREB identified six strategies states are using to have a highly qualified teacher teach a CT course carrying academic credit:

1) Ensure that the CT teacher teaching the CT course for academic credit meets the same academic performance requirements as academic teachers.
2) Validate that the CT teacher has the academic content knowledge and skills for teaching a CT course yielding academic credit.
3) Pair a CT teacher with a highly qualified academic teacher to teach the academic content.
4) Train an academic teacher in contextualized learning using project-based methods.
5) Conduct state-approved training institutes to deepen CT teachers' academic content knowledge and pedagogy skills.
6) Review CT teachers' instructional plans, student assignments and classroom assessments to determine if a sufficient plan exists for teaching embedded academic content.

Some states satisfy the highly qualified requirement through virtual learning or some other electronic form.

While the 11 states allowing CT courses to qualify for academic credits all require the academic content to be taught by a teacher highly qualified in that content as defined by *NCLB*, they meet this requirement in a variety of ways. (See Appendix C.) Some states, such as Virginia, require CT teachers to have an academic credential and to pass the PRAXIS content exam, just as academic teachers must do. Other states, such as Tennessee, allow an academic teacher who is certified in the academic content and trained in contextualized learning using project-based methods to teach the state-approved applied academic courses (e.g., Principles of Technology I and II).

CT teachers in Mississippi teaching CT courses for academic credit are required to attend two weeks of professional development. This professional development is dedicated to understanding how to effectively and efficiently teach the CT curriculum based on increased academic foundations, national standards and industry-recognized certifications.

Some states satisfy the highly qualified requirement through virtual learning or some other electronic form. Kentucky requires the teacher of record for interdisciplinary courses such as construction geometry to be a highly qualified academic teacher who delivers the academic content electronically through DVD-recorded instruction. State leaders indicate that this has been an especially useful strategy for rural school districts.

Validation of Academic Learning

When states award academic credit for CT course work, how do they know that an equivalent or a higher level of learning occurred in the CT course compared to its traditional academic counterpart? SREB considered whether states:

- require CT students to pass the same end-of-course exam if available for the academic course for which the CT course is a substitute.
- allow use of an alternative assessment made up of a collection of summative assessments that measure learning at the end of each project unit.
- allow use of a state-approved, commercial assessment in the core academic area or an industry certification exam that addresses content similar to the academic content for which the credit is being awarded.
- allow the use of a state-approved, teacher-developed end-of-course exam for the CT course designed to assess students' mastery of academic standards for which credit is sought.
- require students to meet the same grading and assessment standards as required in the traditional academic course for which the credit is being awarded.

Six of the 11 states awarding academic credit for CT courses do not meet any of the SREB criteria that could demonstrate parity in academic learning. (See Appendix D.) Florida and Oklahoma are examples of how states can ensure that equivalent academic learning has taken place in the CT course. Recent Florida policy for alternative credits allows academic credit for a CT course or sequence of courses where the majority of standards-based content is consistent with the academic course. It also requires students to pass a state-approved end-of-course (EOC) assessment. The EOC may either be an end-of-course statewide, standardized assessment for the academic course developed or adopted by Florida Department of Education or among those developed by the Florida Virtual School. Similarly, in Oklahoma a student must pass the state's end-of-instruction exams for the comparable academic course in mathematics or science.

Reapproving CT Courses for Academic Credit

The analysis of state policy for course reapproval found that while many SREB states have a process for the initial development and approval of CT courses yielding academic credit, no single process includes all of the following key actions:

- Review CT courses eligible for academic credit at the end of the first three years and at state-specified intervals thereafter to determine if learning is comparable to the learning taking place in traditional academic courses.
- Utilize an external review panel with representatives from the state's secondary and post-secondary systems and their governing bodies, as well as community experts in the career field.
- Analyze academic and technical achievement data for similar student groups to confirm the existence or non-existence of similar achievement outcomes.
- Examine state and local assurances for meeting criteria for awarding academic credit.
- Culminate in course reapproval or a set of recommendations for either revising the course to meet requirements or dropping the course for awarding academic credit.

For the most part, approval policies target CT programs and courses in general — not for the specific purpose of awarding academic credit — and the time between approval and reapproval varies from state to state. Mississippi reviews and revises the curriculum every four years. Louisiana requires a school district to submit an annual evaluation to the state department of education following implementation of a career major program. This evaluation is included in a comprehensive report of program evaluation results submitted to the state legislature. However, the policy does not specify how these results will be used.

Alabama's Business/Industry Certification (BIC) review procedures call for an on-site program review to be conducted every five years for each program in a school system. The BIC process addresses several quality factors including student records, business and industry awareness, instructional competency and certification, industry certification of teachers, program scheduling, and student placement in employment or postsecondary studies. It also includes an examination of lesson plans covering all course content standards and the course syllabus for each course on the teacher's daily schedule for the full year. Teachers with knowledge of courses being taught conduct the reviews, but they cannot conduct reciprocal reviews. While the BIC process gathers evidence of compliance in lesson plans, it does not gauge the level of rigor of instruction for those lessons. Evaluation of implementation is left up to the building principal or assistant.

Georgia, Kentucky and Texas — states with extensive upfront efforts in approving courses — have not defined or specified a timeframe for a reapproval process. According to state officials, these states undertake this task only when there is a major change in state performance standards or graduation requirements.

Four States, Four Approaches

Presented at the 2010 SREB State Leaders' Forum

State leaders from Kentucky, New York, Ohio and Texas shared how their states have approached the award of academic credit for CT course work. While New York and Ohio are not SREB states, their models are invaluable in the study of state policy and processes for allowing academic credit for CT courses.

◆ ◆ ◆

Kentucky *(Deborah Anderson, former college and career readiness branch manager, Kentucky Department of Education)*

Several circumstances motivated the Kentucky State Board of Education to establish policies that allowed Kentucky Department of Education (KDOE) staff to redesign CT courses for academic credit: increased graduation requirements (including more math, science and social studies credits), the need to find ways for CT students to still complete a CT concentration, and recognition of the amount of duplication of academic content between certain academic and CT courses. To date, the board has approved nine CT courses for academic credit: agribiology, agriscience, business economics, computer aided drafting, construction geometry, consumer economics, health and wellness, math for business and industry, and nutrition and food science.

The development process involved teams of CT teachers from a career area working with a KDOE academic consultant to map CT course content and academic content and to determine the gaps in academic standards for a given course. The teams then worked to embed the missing academic standards into the CT course. Most importantly, the resulting courses "had to be true to the occupational standards … and not dilute students' occupational preparation," said Anderson. The outline for each course includes a course overview, guiding and essential questions, identification of academic expectations (i.e., standards) to be addressed, brief descriptions of sample learner activities, and a list of resources. Some include additional sample activities to reach diverse learners.

Because Kentucky requires four math credits for graduation, math has been a primary focus in development of many of these courses. KDOE — in partnership with the Council on Economic Education, family consumer science teachers, and business and finance teachers — developed two courses that include the Algebra II math standards needed to meet the fourth math credit, built around real-world concepts from consumer sciences, economics, business and finance. KDOE also developed a construction geometry course aligned to the 23 required geometry core content standards, allowing the course to fulfill the required geometry credit. The two-credit computer-aided drafting course also yields geometry credit.

Anderson noted that ensuring a highly qualified teacher teaches each course has been the biggest challenge in offering these interdisciplinary courses. At present, these courses are either team-taught with a highly qualified academic teacher and CT teacher or taught by a CT teacher who has dual certification. In addition, the state has produced a DVD through which a master teacher delivers the geometry content for the construction geometry course.

The state has faced other obstacles as well. Core academic teachers tend to assert ownership over the content to be tested. "It is difficult for a geometry teacher to allow the construction geometry course to be used as the delivery method for teaching geometry. Also, CT teachers are sometimes reluctant to change their instructional delivery model and to document student achievement and then have the responsibility for test scores for academic content in the accountability system," said Anderson.

◆ ◆ ◆

New York *(Dave Leavitt, school improvement consultant, SREB/TCTW; and former director of career and technical education, Questar III BOCES, New York)*

In the mid-1990s, New York state started raising its graduation requirements by increasing the number of course credits required. The Regents Diploma became the goal for all students. This shift was not without challenges, the biggest of which was determining how students could complete CT programs with the necessary increase in academic requirements. "Suddenly, CT programs were endangered because students had to take a fourth English class and a third math class," Leavitt said.

CT educators argued that they were already teaching a lot of math, English and science in their courses. In 1999, CT educators began to review their programs in terms of how academic credits could be embedded, how to verify academic learning, and how to have highly qualified teachers in CT courses.

In 2001, the New York Board of Regents adopted a program approval process for authorizing the award of academic credit for CT programs. The program approval process required evidence of having: a) a quality technical and academic curriculum, including integrated English/language arts, mathematics, science,

Four States, Four Approaches (continued)

economics, and government; b) faculty with state certification in appropriate academic and/or technical fields; c) technical assessments that certify students meet current industry standards; d) postsecondary articulation agreements; e) work-based learning experiences; and f) data on student progress and performance on the New York State Regents Exams.

At present, students can earn academic credit through fully integrated CT programs for each of the final units in English, science, math, and economics and government. However, **students can receive academic credit for these integrated CT courses only after they have successfully completed all Regents-level courses and passed the appropriate Regents Exams.** For example, English 11 is a Regents course. CT students must pass the Regents Exam for this course before they can earn the final English credit (English 12) through the integrated CT course. Moreover, such programs must be supported by highly qualified teachers with the appropriate academic credentials.

Validation of academic learning through integrated CT courses is an important element of the state's approach. Students in these courses have passed the same Regents exams as students in traditional academic courses, "so it is the same measure used for CT students as for students who earn credit through academic courses," Leavitt said.

Integrated courses improve student outcomes, Leavitt reported. "What we've learned over the 10-year period is that students successfully completing the integrated programs are actually scoring higher than students who are in the home schools taking the same Regents Exam." In 2009-2010, 91 percent of CT students[6] passed the Comprehensive English Regents Exam, compared with 83 percent of all students.[7] Furthermore, 89 percent of CT students passed the Regents Exam for Integrated Algebra, compared with 72 percent of all students.

◆ ◆ ◆

Ohio *(Stan Heffner, state superintendent of public instruction, Ohio Department of Education)*

In 2006, the Ohio General Assembly established the Ohio Core Curriculum, which increased high school graduation requirements to include four credits in mathematics. At the same time, the state board of education adopted a plan that allows students greater flexibility in proposing alternative ways (i.e. educational options) for meeting the new requirements. In essence, this policy offers a shift from seat time to students' demonstration of subject-area competency as a means of earning course credit.

High school students can earn credit in three ways, or in a combination of these ways: 1) by completing traditional course work; 2) by testing out to demonstrate mastery of the course content; and 3) by pursuing one or more educational options. For the latter two ways, state policy requires local districts to identify their own quality-control standards for what is acceptable and what is not. If the student wants comparable cred-

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[6] New York Department of Education. *School District and BOCES Report Card Data* — http://www.p12.nysed.gov/cte/perkins4/docs/ReportCard10_11f.pdf, accessed March 8, 2011.

[7] New York Department of Education. *The New York State Report Care Comprehensive Information Report 2009-10* — https://www.nystart.gov/publicweb-external/2010statewideCIR.pdf, accessed March 8, 2011.

Four States, Four Approaches (continued)

it for the work, then the expectations must be comparable and meet the district's standards. Heffner said, "If students can show us their ways are equivalent to traditional means, we'll grant the credit. There can be more than one way for learning experiences to occur."

According to Heffner, for students to earn a math credit through a means other than the traditional academic class, school leaders and teachers must make professional judgments about how many math content standards for that grade level have been covered so that the school can give either a full credit, simultaneous credit or partial credit. "This is a different way of looking at integrating academic and career/technical credits," said Heffner.

While transferability of academic credits earned through other means can create barriers for students in other states, Ohio schools transcript those credits no differently than if the student earned the credit in a traditional setting.

The intent of simultaneous credit is for students to receive appropriate and meaningful credit for course work that has academic content standards blended into the technical content. This can range from a full credit to partial credit but should adhere to the learning expectations behind issuance of a Carnegie unit.

◆ ◆ ◆

Texas *(Norma Torres-Martinez, deputy associate commissioner for standards and alignment, Texas Education Agency)*

Recent state policy authorized the award of two academic credits through CT courses and called for a panel to review the 600-plus CT courses available across the state. The goal was to increase rigor and relevance in the CT curricula through redesigned or new courses aligned with the state's new college-readiness standards. The new courses were developed by committees of representatives from business and industry, content specialists from higher education and secondary education, and academic and CT teachers. Ultimately, a subset of these would satisfy the fourth credit in math or science and the fine arts and speech credits required for graduation.

The process resulted in reducing the 600-plus CT courses to fewer than 200. The Texas State Board of Education deemed that 11 of these courses would satisfy the required fourth credit in science,[8] and three would satisfy the required fourth credit in math.[9] While Texas uses end-of-course exams to validate learning in the first three credits required each in English, math, science and social studies, it does not have end-of-course exams for the fourth credit in these content areas. Districts are responsible for the validation of academic learning in these fourth credits.

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[8] CT courses in Texas satisfying the fourth science credit: human anatomy and physiology; medical microbiology; pathophysiology; scientific research and design; principles of technology; engineering design and problem solving; advanced animal science; advanced plant and soil science; food science; forensic science; and advanced biotechnology — http://ritter.tea.state.tx.us/rules/tac/chapter074/ch074f.html.

[9] CT courses in Texas satisfying the fourth math credit: mathematical applications in agriculture, food and natural resources (if taken prior to Algebra II); statistics and risk management; and engineering mathematics — http://ritter.tea.state.tx.us/rules/tac/chapter074/ch074f.html.

Four States, Four Approaches (continued)

"We recognize the issue of the highly qualified teacher … [and] we recognize that we still have a long way to go in this area," said Torres-Martinez. The educator-credentialing department has looked at ways to update CT teacher certification requirement, and teams of higher education and secondary education teachers and leaders in the CT area have conducted a gap analysis to find out the math and science standards that CT teachers need to know in addition to the content knowledge they bring to the table with their certifications. Based on this analysis, the Texas Education Agency developed a framework for 90 hours of professional development designed to help academic and CT teachers meet the highly qualified requirement. Interestingly, the training modules target both academic and CT teachers. "Our hope is that our academic teachers who do a great job in the academic courses but need to bring more relevance into their courses will understand those connections by going through these modules," Torres-Martinez said. "We hope that this is a win-win situation for our students and our teachers."

Recommendations:
Conditions for Awarding Academic Credit for Career/Technical Courses

A few states have taken steps toward developing a solid policy framework and guidelines for awarding a selected number of academic credits through CT courses or allowing certain CT courses — because of their demonstrated rigor — to substitute for a selected number of academic courses. But as states continue to move forward in this effort, the central question remains: **Under what conditions can states recognize academic learning accomplished through approved CT courses?**

Forum discussions identified several solutions to overcome the potential obstacles in awarding academic credit for CT courses: a) Be clear about which Common Core State Standards or other rigorous standards are to be taught in such courses and to what depth. b) Have a process to validate that those standards are being taught and student learning is occurring. c) Ensure the course is taught by a teacher who has demonstrated mastery of the academic knowledge and skills to be taught. d) Have a valid and reliable way to assess that student academic achievement in such courses is equivalent to, if not better than, that found in traditional academic courses.

The following **recommendations for creating a policy framework and establishing guidelines** incorporate both the criteria SREB used in this analysis and solutions policy-makers and educational leaders offered during the State Leaders' Forum. Ultimately, states will need a strong framework that clearly defines their conditions for awarding academic credit for CT courses.

1. **Establish policy to allow the awarding of a select number of academic credits through CT course work.** The policy will need to address how to:
    - Recognize these credits as part of the college-ready academic core required for admission to the states' postsecondary institutions. **The higher education governing board in the**

state must be a part of the vetting and approval process to ensure that courses meet admissions requirements.

- Determine the number of academic credits that students can earn through CT courses. Forum participants suggested that states should limit the number initially to two until an evaluation of student outcomes proves or disproves the practice.
- Specify how such credit will be counted toward high school diploma requirements. SREB recommends that the course count for credit only once unless it includes expanded time to cover academic and CT content found in academic and CT courses.

2. **Institute a process for the development and state approval of CT courses eligible for academic credit and for meeting requirements for postsecondary admission.** This process should result in CT courses with authentic learning that blend the learning of technical and college- and career-readiness academic standards. Such courses could be developed by the state for statewide use or developed by a school through the collaboration of highly qualified academic and CT teachers, with the awarding of academic credit just for students who complete that course in that school. In both cases, the state's higher education institutions would recognize the credit for admissions. Regardless of how courses are developed, states' secondary and postsecondary education systems and their governing bodies should work together to establish guidelines for development of such CT courses and a vetting process for course approval. For each course, an appointed group will need to:

   - Determine the grade-level and college- and career-readiness academic standards in reading, writing, math, and (if appropriate) science, based on Common Core State Standards or other rigorous standards that are essential to the career field.
   - Identify the technical content, drawing upon feedback from experts in the career field, and align and blend the academic standards with the technical content.

An Approach for Approving Integrated Mathematics Courses and Integrated Science Courses for Awarding the Fourth Mathematics and Science Credits

Establish a process to validate a series of math and science standards that are embedded in two or more CT courses and are sufficient for awarding an integrated mathematics or integrated science credit but do not match up with any given math or science course. This would require states to:

- Establish criteria for 1) an integrated mathematics course that encompasses mathematics standards that students most frequently fail to meet, causing many to take remedial mathematics studies when they enter college or 2) an integrated science course that includes those most fundamental science concepts needed to be successful in college-level science courses.
- Develop either a series of summative assessments or an end-of-course exam that can serve as evidence that students have sufficiently mastered the mathematics or science standards addressed through the CT course. Such exams would have to be approved in advance by some review process and the faculty would have to verify that acceptable assessment procedures were followed.

- Determine if sufficient academic standards are covered to warrant the awarding of a full or partial academic credit.
- Develop a course syllabus with enabling learning activities that reflect the level of lesson plans, intellectual assignments, analysis and reflection needed for college and career readiness.
- Utilize an instructional methodology comprised of authentic projects, problems and activities for contextually learning the academics.
- Develop formative and summative assessments to validate that academic achievement is comparable to, if not higher than, the level found in the academic course for similar groups of students.
- Allow the use of alternative assessments, including various commercial assessments and industry-recognized certification exams, to determine whether students have mastered course standards.
- Develop a grading system and criteria for reporting performance levels in technical standards, academic standards and 21st-century skills.
- Require that the course be taught by a highly qualified teacher as defined by *NCLB*.
- Make sure the course title carries the same course title as the academic course on the student's transcript to ensure recognition of the academic credit earned through the CT course as meeting postsecondary admissions requirements and to ease credit transfer from one school to another, one district to another and one state to another.
- Identify any academic standards that are missing but needed to warrant an academic credit, and provide a way to fill those gaps by:
  - developing an online module that captures missing standards in the course;
  - using a sequence of two or more CT courses to encompass sufficient standards; or
  - developing an integrated math or science course that encompasses those readiness skills most needed to succeed in a first-year college course in math or science.

3. **Define requirements for teaching a CT course with embedded academic standards, and provide ways for teachers to fulfill those requirements.** This will require states and/or locally controlled school districts to:
   - Ensure that CT teachers who teach courses for academic credit meet the same academic performance requirements as academic teachers.
   - Validate that CT teachers have sufficient academic content knowledge and skills to meet the *NCLB* highly qualified teacher requirements for teaching CT courses eligible for academic credit. They should be required to pass some type of state-approved exam to verify content mastery to teach the academic standards embedded in the course.
   - Specify ways such a CT course may be taught, including:

- allowing a CT teacher who does not meet the highly qualified requirement to work with a highly qualified academic teacher or team of highly qualified teachers to teach the academic standards embedded in the course;
- allowing an academic teacher who is certified in the academic content and trained in contextualized learning using project-based methods to teach the CT course; and
- providing a state-approved, two-week summer institute (on-site or virtual) to deepen CT teachers' content knowledge and pedagogy skills for teaching academic standards through authentic project-based learning and to enable them to pass the state-approved exam for being a highly qualified teacher.

- Establish a process for reviewing CT teachers' instructional methods, daily lesson plans with enabling activities and formative and summative assessments to verify depth of content and level of instruction.

4. **Validate students' academic learning in approved CT courses eligible for academic credit** through one or more of the following:
   - an end-of-course exam for the academic course for which the CT course is a substitute;
   - an alternative assessment comprising a collection of summative assessments that measure learning at the end of each project unit;
   - a state-approved, commercial academic assessment or industry certification exam that has been evaluated as having sufficient academic content for the awarding of an academic credit, based on acceptable performance on the academic-related items on the exam; and
   - a state-approved, teacher-developed end-of-course exam for the CT course.

Regardless of the option(s) used, students must be required to meet the same grading and assessment standards as required for students in the traditional college-ready academic course.

5. **Establish a review process to assess the effectiveness of CT courses approved for academic credit by determining if student outcomes are comparable to, if not better than, student outcomes in the related academic course.** This process would require the state to:
   - Conduct a review three years after the course is implemented and at regular, state-specified intervals thereafter.
   - Utilize an external review panel with representatives from the state's secondary and post-secondary systems and their governing bodies, and community experts in the career field.
   - Analyze academic and technical achievement data from student groups to confirm that student learning of academic content through CT courses is equivalent to learning found in traditional academic courses for comparable groups of students.
   - Examine state and local assurances for meeting criteria for awarding academic credit.
   - Evaluate whether the technical content in the course is up to date.

- Determine whether the course can be reapproved and, if not, provide a set of recommendations for either revising the course to meet requirements or eliminating the course for academic credit.

6. **Provide state guidance for local districts that decide to award academic credit for CT courses.** Such guidance should be centered around students' best interests and encourage an acceptable level of standardization. State guidance should:

   - Require districts or schools to identify the Common Core State Standards or other rigorous academic standards that will be embedded in select CT courses.
   - Assist districts in developing instructional materials — fully developed project-based units and lesson plans with enabling learning activities for teaching the academic standards through the project-based platform and career context. This may require the state to assign a key individual in the department of education to work with individual districts and schools to develop and vet these courses.
   - Establish criteria for formative and summative assessments that students must meet before credits are awarded.
   - Include an auditing system to review the local system's work and require the system to produce evidence that academic learning in the course is equivalent to, if not better than, learning taking place in academic courses.

Summary

Career/technical courses can provide an alternative platform and context for more students to deepen their understanding of abstract academic concepts. When CT courses are purposefully designed to encompass college- and career-readiness academic standards equivalent to those found in traditional academic courses, students can amass not only technical skills but also academic knowledge and skills needed for high school graduation and postsecondary study. Depending on the extent of academic standards addressed and the conditions under which they are taught, such courses may warrant academic credit.

States expecting to recognize academic learning in CT courses by awarding academic credit need to take swift action to develop and implement a solid policy framework and guidelines for approving such courses. At a minimum, the framework and guidelines should include:

- a process for course development and state approval, employing all stakeholders;
- assurances that academic and CT teachers can qualify to teach these redesigned courses;
- ways in which academic learning in these redesigned courses can be validated; and
- a review process that defines evidence needed in the first three years of the course offering to assess its effectiveness and to determine whether it continues to warrant the award of academic credit.

Such policy and guidelines will guarantee that the opportunities afforded through contextual learning have true value.

APPENDIX A:

Allowing the Award of Academic Credit Through CT Course Work A — Snapshot of SREB States

SREB Criteria for Policy Framework	AL	AR	DE[1]	FL	GA	KY	LA	MD[1]	MS	NC	OK	SC	TN	TX	VA	WV
1. Allow the award of academic credit through CT courses.																
• Award academic credit through CT.	✓	—	—	✓	✓	✓	✓	—	✓	✓	✓	—	✓	✓	✓	—
• Recognize such credits as part of the college-ready academic core required for postsecondary admission.	✓	—	—	✓	✓	✓	✓	—	✓	✓	✓	—	✓	✓	✓	—
• Limit the number of academic credits that students can earn through CT course work to no more than three credits.[2]	✓	—	—	✓	✓	❖	✓	—	✓	✓	❖	—	❖	✓	✓	—
• Count such credit only once toward high school diploma requirements unless instruction time is expanded.	✓	—	—	❖	✓	❖	❖	—	❖	✓	✓	—	✓	✓	✓	—
Level of Policy Support	●	—	—	◖	●	◖	◖	—	◖	●	◖	—	◖	●	●	—

✓ Evidence of policy — No academic credit for CT ❖ No evidence of policy ◖ State policy partially in support (1 to 3 of 4 criteria) ● State policy near or in full support (4 of 4 criteria)

Sources: Information gathered in 2010-2011 from websites for individual state departments of education (DOEs) and boards of education (BOEs), surveys of state CT directors, and follow-up contact with DOE staff. State leaders reviewed this policy summary in March 2012.

[1] Locally controlled; some local school districts allow the awarding of academic credit for CT courses.

[2] Number of academic credits allowed to be earned through CT courses: Alabama (2), Arkansas (0), Delaware (0), Florida (3), Georgia (3), Kentucky (6), Louisiana (4-5), Maryland (0), Mississippi (3.5), North Carolina (3), Oklahoma (2), South Carolina (0), Tennessee (6), Texas (2), Virginia (3), West Virginia (0).

APPENDIX B:

Instituting a Process for Development and Approval of CT Courses Eligible for Academic Credit — A Snapshot of SREB States

SREB Criteria for Policy Framework	AL	AR	DE[1]	FL	GA	KY	LA	MD[1]	MS	NC	OK	SC	TN	TX	VA	WV
2. Institute a process for development and state approval of CT courses eligible for academic credit and meeting requirements for postsecondary admission.																
• Identify the technical content.	✓	—	—	✓	✓	✓	✓	—	✓	✓	✓	—	✓	✓	✓	—
• Identify grade-level and college- and career-readiness standards essential to career field.	✓	—	—	✓	✓	✓	✓	—	✓	✓	✓	—	✓	✓	✓	—
• Determine if sufficient academic standards are covered to warrant an academic credit.	✓	—	—	✓	✓	✓	❖	—	❖	❖	✓	—	✓	✓	❖	—
• Develop a course syllabus with enabling activities reflecting college readiness.	✓	—	—	❖	✓	✓	❖	—	✓	❖	✓	—	✓	❖	❖	—
• Utilize project-/problem-based instructional methodology.	❖	—	—	❖	❖	❖	❖	—	❖	❖	✓	—	✓	❖	❖	—
• Develop formative and summative assessments.	❖	—	—	❖	✓	❖	❖	—	✓	✓	✓	—	✓	❖	❖	—
• Allow use of alternative assessments.	❖	—	—	✓	❖	❖	❖	—	❖	✓	✓	—	✓	❖	✓	—
• Develop a grading system and criteria for reporting performance levels in academic standards, technical standards and 21st-century skills.	✓	—	—	❖	❖	❖	❖	—	✓	❖	✓	—	✓	❖	✓	—
• Make sure CT course title carries same course title as academic course.	✓	—	—	❖	❖	❖	❖	—	❖	❖	❖	—	❖	✓	❖	—
• Create a safety net to cover standards not included in CT course to warrant credit.	❖	—	—	❖	❖	❖	❖	—	❖	❖	❖	—	❖	❖	❖	—
• Apply process to both state-developed and locally developed CT courses eligible for academic credit.	✓	—	—	✓	✓	❖	❖	—	✓	✓	✓	—	✓	❖	✓	—
Level of Policy Support	●	—	—	◖	◖	◖	◖	—	◖	◖	●	—	●	◖	◖	—

✓ Evidence of policy — No academic credit for CT ❖ No evidence of policy ◖ State policy partially in support (1 to 6 of 11 criteria) ● State policy near or in full support (7 to 11 of 11 criteria)

Sources: Information gathered in 2010-2011 from websites for individual state departments of education (DOEs) and boards of education (BOEs), surveys of state CT directors, and follow-up contact with DOE staff. State leaders reviewed this policy summary in March 2012.

[1] Locally controlled; some local school districts allow the awarding of academic credit for CT courses.

APPENDIX C:

Defining Teacher Requirements for Teaching a CT Course Eligible for Academic Credit — A Snapshot of SREB States

SREB Criteria for Policy Framework	AL	AR	DE[1]	FL	GA	KY	LA	MD[1]	MS	NC	OK	SC	TN	TX	VA	WV
3. Define teacher requirements for teaching a CT course with embedded academics and provide ways for teachers to meet those prerequisites.																
• Ensure that CT teachers who teach courses for academic credit meet the same academic performance requirements required of academic teachers.	✓	—	—	✓	✓	✓	❖	—	❖	✓	✓	—	✓	✓	✓	—
• Validate that CT teachers have sufficient academic content knowledge and skills for teaching CT courses eligible for academic credit by passing some type of state-approved exam.	✓	—	—	✓	✓	✓	✓	—	✓	✓	❖	—	✓	✓	✓	—
• Allow a CT teacher who is not highly qualified in the academic content to work with a highly qualified academic teacher or team of teachers to teach the course.	❖	—	—	❖	❖	✓	❖	—	❖	❖	✓	—	❖	❖	❖	—
• Allow an academic teacher certified in the academic content *and* trained in contextualized learning using project-based methods to teach the course.	❖	—	—	❖	❖	❖	❖	—	❖	❖	❖	—	✓	❖	❖	—
• Provide a state-approved, two-week summer institute or equivalent training to deepen CT teachers' academic content knowledge and pedagogy skills.	❖	—	—	❖	❖	❖	❖	—	✓	❖	✓	—	❖	✓	✓	—
• Establish a process for reviewing CT teachers' instructional methods, assignments and assessments to verify depth of content and level of instruction.	✓	—	—	❖	❖	❖	❖	—	❖	❖	❖	—	❖	❖	❖	—
Level of Policy Support	◖	—	—	◖	◖	◖	◖	—	◖	◖	◖	—	◖	◖	◖	—

✓ Evidence of policy — No academic credit for CT ❖ No evidence of policy ◖ State policy partially in support (1 to 3 of 6 criteria) ● State policy near or in full support (4 to 6 of 6 criteria)

Sources: Information gathered in 2010-2011 from websites for individual state departments of education (DOEs) and boards of education (BOEs), surveys of state CT directors, and follow-up contact with DOE staff. State leaders reviewed this policy summary in March 2012.

[1] Locally controlled; some local school districts allow the awarding of academic credit for CT courses.

APPENDIX D:

Validating Academic Learning Through CT Courses Eligible for Academic Credit — A Snapshot of SREB States

SREB Criteria for Policy Framework	AL	AR	DE[1]	FL	GA	KY	LA	MD[1]	MS	NC	OK	SC	TN	TX	VA	WV
4. Validate students' academic learning in CT courses eligible for academic credit.																
• Require CT students to pass the end-of-course exam for the academic course for which the CT course is a substitute.	❖	—	—	✓	❖	❖	❖	—	❖	✓	✓	—	✓	❖	❖	—
• Allow use of an alternative assessment made up of a collection of summative assessments that measure learning at the end of each project unit.	❖	—	—	✓	❖	❖	❖	—	❖	❖	✓	—	✓	❖	✓	—
• Allow use of a state-approved, commercial assessment or industry certification exam.	❖	❖	❖	✓	❖	❖	❖	❖	❖	❖	✓	❖	❖	❖	✓	❖
• Allow the use of a state-approved, teacher-developed end-of-course exam for the CT course.	❖	—	—	❖	❖	❖	❖	—	❖	❖	❖	—	❖	❖	❖	—
• Require students to meet the same grading and assessment standards as required for students in the regular college-ready academic course.	❖	—	—	✓	❖	❖	❖	—	❖	✓	✓	—	❖	❖	✓	—
Level of Policy Support	○	—	—	●	○	○	○	—	○	◖	●	—	◖	○	◖	—

✓ Evidence of policy — No academic credit for CT ❖ No evidence of policy ○ No state policy in support of criteria

◖ State policy partially in support (1 to 3 of 5 criteria) ● State policy near or in full support (4 to 5 of 5 criteria)

Sources: Information gathered in 2010-2011 from websites for individual state departments of education (DOEs) and boards of education (BOEs), surveys of state CT directors, and follow-up contact with DOE staff. State leaders reviewed this policy summary in March 2012.

[1] Locally controlled; some local school districts allow the awarding of academic credit for CT courses.

APPENDIX E:

Establishing a Review Process to Assess Effectiveness of CT Courses Eligible for Academic Credit — A Snapshot of SREB States

SREB Criteria for Policy Framework	AL	AR	DE[1]	FL	GA	KY	LA	MD[1]	MS	NC	OK	SC	TN	TX	VA	WV
5. Establish a review process to assess effectiveness of CT courses approved for academic credit to provide evidence that student outcomes are comparable to, if not better than, student outcomes in the traditional academic course.																
• Review CT courses eligible for academic credit at the end of the first three years and at state-specified intervals thereafter.	❖	—	—	✓	❖	❖	❖	—	❖	❖	❖	—	✓	❖	❖	—
• Utilize an external review panel with representatives from the state's secondary and postsecondary systems and their governing bodies, and community experts in the career field.	✓	—	—	✓	❖	❖	❖	—	✓	❖	❖	—	❖	❖	✓	—
• Analyze academic and technical achievement data for all student groups to confirm student outcomes.	❖	—	—	✓	❖	❖	❖	—	❖	❖	✓	—	✓	❖	✓	—
• Examine state and local assurances for meeting criteria for awarding academic credit.	❖	—	—	❖	❖	❖	❖	—	❖	❖	❖	—	✓	❖	❖	—
• Culminate in course reapproval or a set of recommendations for either revising the course to meet requirements or eliminating the course.	✓	—	—	✓	❖	❖	❖	—	❖	❖	✓	—	✓	❖	✓	—
Level of Policy Support	◖	—	—	●	○	○	○	—	◖	○	◖	—	●	○	◖	—

✓ Evidence of policy — No academic credit for CT ❖ No evidence of policy ○ No state policy in support of criteria

◖ State policy partially in support (1 to 3 of 5 criteria) ● State policy near or in full support (4 to 5 of 5 criteria)

Sources: Information gathered in 2010-2011 from websites for individual state departments of education (DOEs) and boards of education (BOEs), surveys of state CT directors, and follow-up contact with DOE staff. State leaders reviewed this policy summary in March 2012.

[1] Locally controlled; some local school districts allow the awarding of academic credit for CT courses.

APPENDIX F:
Legislation, Guidelines and Practices

State	Statute/Code/Guideline	Notes
Alabama	i. It is the intent of the Alabama Legislature that credit for required basic core academic courses may be earned in conjunction with vocational courses and/or programs. ii. A total number of two embedded credits may be earned. iii. The BIC review process provides several checklists for evidence of standards and quality in CT courses.	i. Alabama's Administrative Code 290-6-1-.01. ii. Alabama's Administrative Code 290-3-1. iii. General Program Business/Industry Certification, *Standards/Quality Factors Checklist: Career. Section 3. Career and Technical Curriculum Section.*
Arkansas	None specified	
Delaware	None specified	
Florida	i. Florida statutes require the commissioner of education to implement a pilot project in up to five school districts beginning in the 2012-2013 school year that allows school districts to award alternative course credit for students enrolled in nationally or state-recognized industry certification programs, as defined by the Agency for Workforce Innovation in accordance with the criteria described in s. 1003.492(2). ii. Implementation guidelines allow students to earn credit in algebra, geometry, or biology core courses by taking a career course that includes a minimum of 50 percent of the credit core course benchmarks and passing an end-of-course examination in the core subject.	i. Title XLVIII, K-20 Education Code of Florida Statues. Florida Senate Bill 1270, 2011 Legislative Session. ii. Florida Administrative Code: Rule 6A-6.0651.
Georgia	The state board of education, the Board of Regents of the University System of Georgia, and the board of technical and adult education must work together so that academic courses that are embedded within career, technical and agricultural education courses (CTAE) are given appropriate academic credit at the high school level and recognized at the postsecondary level.	House Bill 186, Georgia General Assembly, 2011-2012 Regular Session, effective May 13, 2011.
Kentucky	Kentucky statues relative to minimum requirements for high school graduation include a provision that allows an integrated, applied, interdisciplinary, occupational, or technical course that prepares a student for a career path based on the student's individual learning plan to be substituted for a traditional Algebra I, geometry or Algebra II course. This substitution is granted on an individual student basis if the course meets the content standards in the program of studies.	Kentucky Board of Education: 704 *Kentucky Administrative Regulations* (KARS) 3:303, Required Program of Studies, April 2006.
Louisiana	i. Students may substitute selected CT courses to meet required fourth math, science, social studies or art units for graduation. ii. The Louisiana Board of Regents recognizes fourth science, social studies or arts credits earned through industry-based-certification-related courses (IBCs) as meeting admissions requirements to the public four-year universities. At present, the board has approved 26 IBCs that students may use to fulfill the required fourth science credit, 22 IBCs for the required fourth credit in social studies and 36 IBCs for art.	i. Louisiana Administrative Code. Title 28, Education, Part CXV. Bulletin 741: Louisiana Handbook for School Administrators. Section 2318. ii. Louisiana Board of Regents. *Minimum Admissions Standards for First-Time Freshmen, 4-Year,* June 18, 2010.
Mayland	None specified	

APPENDIX F:

Legislation, Guidelines and Practices (continued)

State	Statute/Code/Guideline	Notes
Mississippi	i. One of the three required mathematics units may be in drafting, if the student completes the two-course sequence for Drafting I & II. One science unit may be in one of the following technology applications: introduction to agriscience, Agriscience I, concepts of agriscience, allied health, aquaculture, science of agricultural plants, science of agricultural animals or science of agricultural environment. Two science units may be in the following courses if the student completes the two-course sequence: Agriscience I & II, Allied Health I & II, Aquaculture I & II, Forestry I & II, Horticulture I & II, Plastics and Polymer Science I & II and Technology Applications I & II. Two units may be earned by completing the following AEST three-course sequence: one unit in concepts of agriscience; one unit in science of agricultural animals, or science of agricultural plants, or science of agricultural environment; and one unit in agribusiness and entrepreneurship. ii. CT teachers teaching CT courses for academic credit are required to complete two weeks of professional development.	i. State Board Policy ICFA-1 – Appendix A-3, Graduation Requirements Standard 20 Senate Bill 2389 (2010) provides for high school career option programs and career track curriculum, but it does not meet Mississippi's institutions of higher learning admissions requirements. ii. *Mississippi State Plan for Vocational and Technical Education: Program Year 2008 to Program Year 2013.*
North Carolina	i. The fourth math credit can be earned through an approved CT course. ii. A fourth science credit for physics can be earned through completion of Principles of Technology I & II, and a physical science credit can be earned through completion of Principles of Technology I only. iii. To meet the University of North Carolina minimum entrance requirements for a single physical science credit, the student must successfully complete both Principles of Technology I and Principles of Technology II and take the VoCATS post-assessments.	i. *Future-Ready Core Course of Study Mathematics Graduation Requirements Effective 2010-2011 and 2011-2012* (Policy HSP-N-004 from http://sbepolicy.dpi.state.nc.us/). ii. State Board Policy: High School Graduation Requirements (Standard Course of Study). iii. Letter from Elsie C. Leak, Associate Superintendent, Curriculum and School Reform Services, Public Schools of North Carolina, to LEA Superintendents. Subject: Graduation and Testing Requirements in High School Science. December 21, 2005.
Oklahoma	i. State Board of Education Curricular Standards and Options for High School Graduation policy states the following: "Academic and vocational-technical courses designed to offer sets of competencies integrated or embedded within the course that provide for the teaching and learning of the appropriate skills and knowledge in the Priority Academic Student Skills (PASS), as adopted by the State Board of Education, may upon approval of the Board be counted for academic credit and toward meeting the graduation requirements of this section." ii. Courses count for college entrance requirements only if the teacher is subject-certified.	i. Oklahoma Statute §70-11-103.6. OK 700.S.S1210.521. *Implementation Guide,* Revised October 2011. ii. Oklahoma Department of Career and Technology Education, *Oklahoma CTE Guidelines for Academics,* Spring 2010.
South Carolina	None Specified	

APPENDIX F:

Legislation, Guidelines and Practices (continued)

State	Statute/Code/Guideline	Notes
Tennessee	i. Relative to the Tennessee Graduation Requirements, selected "hybrid" CT courses can be used as substitutes for certain academic courses/graduation requirements as listed below: ■ Agriscience satisfies one laboratory credit in the area of life sciences required for graduation. ■ Health science anatomy & physiology (A&P) satisfies one of the science credits required for graduation, or it may be offered for one vocational credit. The health science teacher must be highly qualified for A&P to be given as a science credit. ■ Consumer economics satisfies one-half credit in economics required for graduation. ■ Nutrition science satisfies either one laboratory science credit in the area of life sciences (if team taught with a biology teacher) or one credit of physical science (if team taught with a chemistry teacher) required for graduation. ■ Completion of one of the core marketing education courses as signified by an asterisk (*) in the list of approved high school courses satisfies the economics requirement for graduation. ■ Completion of one credit in personal finance and building wealth satisfies the graduation requirement for personal finance. ■ American business legal systems satisfies one-half credit in U.S. government. ■ Business economics or international business/marketing or virtual enterprise international satisfies one-half credit in economics. ii. Schools will design curriculum and implement instruction in ways that invite students to participate in their own learning. In both academic and technical courses, teachers will emphasize active learning strategies such as cooperative learning and the application of knowledge to real-life situations. Furthermore, policy states that applied academic courses, which use hands-on strategies, will be implemented in high schools statewide. iii. The completion of Principles of Technology I and II is equivalent to Physics I.	i. Tennessee State Board of Education. High School Policy 3.205. *Approved High School Courses*. Revised July 31, 2009. ii. Tennessee State Board of Education. High School Policy 2.103. Revised January 25, 2008. iii. Tennessee State Board of Education. High School Transition Policy Rule 0520-1-3-.06. *Tennessee High School Courses Which Meet the University of Tennessee and Tennessee Board of Regents University Admissions Requirements,* Revised April 2006.
Texas	Texas Education Code as authorized by HB 3485 includes provisions for the award of academic credit through a CT course or series of courses. It allows a student to comply with the curriculum requirements for a mathematics course or science course by successfully completing an advanced CT course designated by the State Board of Education as containing similar and rigorous academic content.	House Bill 3485, 80th Texas Legislature, May 2007.
Virginia	i. Students who complete a career and technical education program sequence and pass an examination, occupational competency or assessment in a career and technical education field that confers certification or an occupational competency credential from a recognized industry or trade or professional association, or acquires a professional license in a career and technical education field from the Commonwealth of Virginia may substitute the certification, competency credential or license for a) the student-selected verified credit; and b) either a science or history and social science verified credit when the certification, license or credential confers more than one verified credit. The examination or occupational competency assessment must be approved by the Board of Education as an additional test to verify student achievement. ii. Computer mathematics may be used in conjunction with Algebra I and geometry to satisfy mathematics graduation requirements if the student also completes a career and technical concentration. The sequence of Principles of Technology I and Principles of Technology II will satisfy one standard unit of credit in laboratory science for physics and one elective credit. Students who enroll in principles of technology courses for a physic credit must have completed Algebra I and two other laboratory science courses as specified by the Standards of Accreditation prior to enrolling in principle of technology.	i. Code of Virginia. Title 22.1 Education, Section 253.13, Standard 44. Student achievement and graduation requirements. (§ 22.1-253.13:4) ii. "Board of Education Approved Courses to Satisfy Graduation Requirements for the Standard, Standard Technical, Advanced Studies, Advanced Technical, and Modified Standard Diplomas in Virginia Public Schools (Effective with Ninth-Grade Class of 2010-2011)," May 28, 2009.
West Virginia	None Specified	

Sources: Information gathered in 2010-2011 from websites for individual state departments of education (DOEs) and boards of education (BOEs), surveys of state CT directors, and follow-up contact with DOE staff.

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