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The past two decades have seen a dramatic expansion of the high school reform movement integrating academic and career-technical coursework in career-themed pathways, with the aim of preparing high school students for post-secondary education and building skills for long-term career success. This policy brief focuses on courses that satisfy both academic and career-technical standards. Such courses can be a key component of an integrated program of study. This brief describes current California regulations about required qualifications of teachers in these courses, and proposes possible policy options to make these dual academic/CTE courses available to more students.

Growing number of joint academic/CTE courses

Nationally, we are seeing an expansion of the college and career pathway approach, as reflected in the Obama administration's 2012 commitment to double the number of students in such programs by creating 3,000 new academies, and the subsequent allocation of funding through the Youth Career Connect grants and other federal initiatives. New national Common Core Standards explicitly emphasize college and career readiness, and encourage a pedagogical shift to incorporate practical applications of academic concepts. Simultaneously, new national standards for Career Technical Education (CTE) also emphasize integration of academic content, creating a natural partnership for Common Core implementation.

California represents a trend among states in emphasizing college and career pathways as a central reform strategy. State funding for such pathways began with the 1985 launching of the California Partnership Academies (CPAs). As repeated evaluations of

career academies found positive outcomes for students, the California Legislature expanded the number of CPAs to more than 400. The James Irvine Foundation has provided major funding for the Linked Learning approach, creating systems to support college and career pathways. Most recently, the state has committed \$500 million in California Career Pathways Trust grants, promoting intense inter-agency and inter-district collaboration, coordinated employer and industry involvement, and systematic reform of institutional practices. This cascade of funding has dramatically increased demand for courses that satisfy both academic and CTE standards, and for instructors who are qualified to teach these dual academic/CTE courses.

The college and career pathway approach is scaling up at the same time that new Common Core College and Career Readiness Standards emphasize applied academics and cross-disciplinary critical thinking skills. The instructional practices required for Common Core implementation in secondary schools are closely aligned with those often used by interdisciplinary college and career pathway teams, including project-based instruction, scaffolding, backwards planning, performance-based outcomes, interdisciplinary curricular integration, authentic assessment, and industry-involved work-based learning.

One consequence of this confluence is a rapidly increasing number of

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courses that meet both academic and CTE requirements. In the 2000-2001 school year, only 258 such courses had been approved by the University of California Office of the President (UCOP) to meet UC “a-g” admission requirements. As of 2014, more than 10,000 such courses have been approved for public schools alone. According to the California Department of Education (CDE)’s 2013 report from the Career and College Transition Division, 90% of the schools reviewed included CTE courses that met UC’s “a-g” admissions requirements. While these courses are disproportionately electives, and in a limited number of sectors, their development represents a growing recognition of the value of integrating academic and technical education.

The rapid expansion of dual academic/CTE courses augurs well for students, who are more likely to graduate prepared for post-secondary education, with a foundation of knowledge and skills in a career field that interests them. In districts with a traditional six period day, it is nearly impossible for students to take any needed remedial courses, a full CTE sequence, and all the courses required for college eligibility. Wanting to improve graduation rates and college eligibility for all students, and shifting to Common Core instructional approaches, many districts are now incorporating dual academic/CTE courses into their college and career pathways. However, implementing these courses can raise difficult human resource issues. One set of issues relates to the general shortage of CTE teachers. Another set of issues, particular to dual academic/CTE courses, arise out of the necessity to satisfy the teacher credentialing requirements of both the Carl D. Perkins Technical Education Improvement Act and the No Child Left Behind Act.

Shortage of CTE teachers

With the current rapid expansion of college and career pathways, particularly in areas of high labor force demand and high wages, access to appropriately trained CTE teachers is a major concern. In a February 2014 brief from the Center on Great Teachers and Leaders, Catherine Jacques and Amy Potemski note:

Currently, half the states across the country have major shortages of CTE teachers, with more shortages expected to result from retirement in the near future. These shortages are also due in part to the reduction of CTE teacher preparation programs and problems with CTE

*teacher retention*¹.

Moreover, the lack of adequate preparation, induction or mentoring programs for new CTE teachers results in attrition rates significantly higher than for beginning teachers in general. A 2012 study by Ben Mordan at Pennsylvania State University found that new CTE teachers who received mentoring were more than 6.5 times as likely to remain in teaching as those who received no mentoring².

One potential source of CTE teachers is the pool of experienced professionals, who may be at or near retirement age, and may be interested in teaching the next generation. However, professionals interested in teaching after careers in industry must factor in the negative impact of such a move on their retirement benefits. The Windfall Elimination Provision (WEP) and the General Pension Offset (GPO) reduce or eliminate earned Social Security benefits for people moving from the Social Security retirement system to a public pension system, providing a strong disincentive to teaching as a second career. Because Social Security benefits are determined by a progressive formula benefitting low-income workers, the WEP adjusts that formula to take into account additional income from non-social security public pension systems. Similarly, the GPO reduces social security benefits for spouses, widows or widowers by two thirds of the total public pension amount.⁴

Credentialing requirements

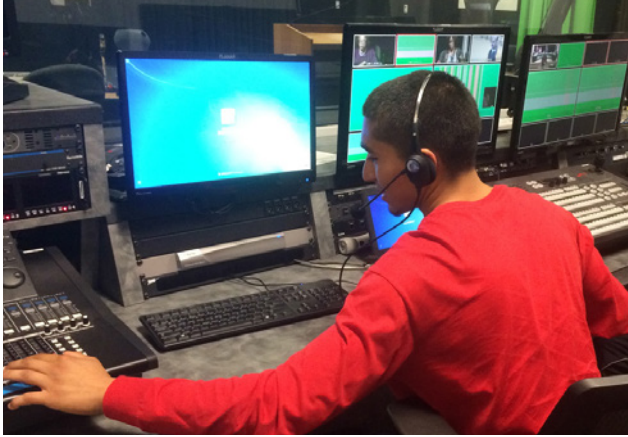
Teacher credentialing requirements complicate the introduction of dual academic/CTE courses. Here is a brief summary of the relevant rules.

First, any course that is supported by Federal funding under the Perkins Act or by state CPA funds must be taught by an instructor with a CTE credential. Academic teachers who wish to teach a dual academic/CTE course that is reported as a CTE course for Perkins or CPA must acquire a CTE credential. For reporting in the California Longitudinal Pupil Achievement Data System (CALPADS): If an academic teacher WITHOUT a CTE credential is to teach a dual academic/CTE course, the course should be reported in CALPADS as an academic course.⁵

Second, any course that satisfies an academic subject requirement for graduation must be taught by a teacher who is Highly Qualified according to NCLB guidelines. A CTE instructor who teaches a dual academic/CTE course required for graduation must satisfy the NCLB guidelines: that is, the teacher must have a bachelor’s degree as well as a teaching credential. There is also an alternative process for teachers issued credentials before July 1, 2002 to demonstrate competence in an academic field, detailed in the Elementary and Secondary Education Act’s Teacher Requirements Resource Guide.⁶

To address the shortage of CTE teachers in California, the California Commission on Teacher Credentialing has enacted the following rules³:

- A preliminary CTE credential requires three years of work experience in a field, but a “year” is 1000 hours.
- One year must be in the last five years, or two in the last ten, but post-secondary coursework, internships and teaching in the field may be used to meet that “recency” requirement.
- General education teaching experience can now substitute for up to one year of experience.
- 48 semester units of post-secondary education in the career field substitutes for up to two years of work experience.
- Possession of an advanced certification within the industry field can count for one year of work experience.
- One year of actual work experience must be verified but this can include paid or unpaid experience, including teacher externships, hobbies, volunteer work, and self-employment.
- There is a temporary one-year credential available for teachers who will be working closely with industry partners in high demand fields, the Business and Industry Partnership Teacher Credential, intended to support new teachers coming from high demand industry fields to try out teaching.



For CALPADS reporting: If the course is required for graduation and is also a reported CTE course, the course must be listed as a CTE course (using 4,000 – 5,000 codes), and districts must change the NCLB Core column from U to Y and add the content area to the NCLB Content Area Category Assigned Name column. Dual academic/CTE courses that count as UC/CSU “g” electives, but are not needed to satisfy academic subject requirements for graduation, can be taught by CTE teachers who do not meet NCLB guidelines for the academic subject.⁷

Examples of difficulty implementing dual academic/CTE courses

To understand how credentialing requirements complicate implementation, consider a couple of recent examples. In one instance, a team of pathway teachers at a comprehensive high school proposed to develop a new ninth grade physics course that would be intended to meet a UC lab science requirement and provide a solid foundation for advanced manufacturing and engineering pathways. The new course could be taught by an instructor with a bachelor’s degree in an engineering-related field and a CTE credential. One obstacle to this solution is that people with engineering degrees who want to teach applied physics to high school students are rare. A second obstacle is that, if the instructor did not also have a credential to teach science, the science department would not support the introduction of a new course that would push tenured science teachers out of those sections. This inner city school is experiencing a decline in student enrollment, and such a move could result in layoffs in which valued science teachers’ positions are threatened.

Alternatively, the course might be taught by an instructor with a physical science credential. An obstacle to this solution is that the teacher would have to learn enough about engineering and advanced manufacturing to teach the parts of the course

that involve applications in those fields. She or he would need to experience an externship in the field as well as considerable professional development in instructional practices to effectively introduce students to physics as it applies to advanced manufacturing or engineering. A second obstacle is that, if the course is

reported (for Perkins or CPA funding) as a part of a core CTE sequence, that academic teacher would also need to obtain a CTE credential in the field.

A CTE teacher in a course that meets academic subject requirements would have to be trained in subject standards as well as appropriate instructional practices for such an academic course. An example is the Introduction to Fire Science course developed recently by an interdisciplinary team at a large comprehensive high school. Experienced teachers in chemistry, biology, and environmental science collaborated with a former firefighter who had considerable experience teaching the CTE skills for firefighting. They developed a course that explores fire science using applications from the field of firefighting for labs and practical applications throughout. Although the CTE content is second nature to the former firefighter, the skills involved in teaching a high school lab science class are new.

I was never intimidated going into a burning structure, doing CPR on a pulseless non-breather or holding a broken body together but teaching science to teenagers is so out of my league. –CTE Fire Science Teacher

In collaboration with the local Firefighters Association, her district funded the interdisciplinary collaboration, coursework to develop her science teaching skills, and training in current CAD software specific for the firefighting field.

Working with science department colleagues will be essential to her development as an applied science educator, and as that department implements Next Generation Science Standards, she will be both a valuable resource and a learner. She will need professional development with both her pathway teacher team and her science department colleagues, and could benefit greatly from a mentor. As the key link between the pathway and the Firefighters Association, she will also need administra-

tive support to access work-based learning resources for her students, such as field trips, job shadows and internships as well as pathway aligned post-secondary educational options.

This is a pivotal moment for addressing these concerns. The rapid growth of dual academic/CTE courses is a natural outgrowth of a fundamental shift in educational policy, with significant implications for the education workforce. As CTE programs become more integral to academic learning, and college and career pathways serve much larger numbers of students, finding ways to recruit, deploy, and retain more teachers qualified to integrate academics and career-technical skills must become a central priority for education leaders.

What can districts do?

The rapid expansion of dual academic/CTE courses offers great promise in improving student access to college and career preparation. The following recommendations are derived both from research and from practices districts have developed as they take up this challenge:

1. Support new CTE teachers in college and career pathways to participate in induction programs, and provide them with mentors.
2. Support CTE teachers in college and career pathways to participate in professional development with appropriate academic departments as well as with their interdisciplinary pathway teams. Provide opportunities for them to improve their capacity to integrate academic content into their CTE courses.
3. Support academic teachers in college and career pathways to obtain CTE credentials and industry experience by providing incentives and assistance.
4. Work with industry partners and regional consortia to develop teacher externship programs that provide access to current industry practices, and professional development opportunities to translate that experience into high school curriculum and instructional practices.
5. Collaborate with teachers’ unions to develop incentive programs that encourage and support teachers to meet new credentialing demands.
6. Support CTE and academic teachers to integrate their courses using team

teaching, by scheduling courses back-to-back, and providing regular common planning time.

7. In California, direct Local Control funding to maintain and build college and career pathways, such as professional development that connects CTE and academic teachers in collaborative course development, incentives for participation in externships, and liability insurance for student internships.

How can state policy support districts to make these changes?

The California Department of Education (CDE) has played a leading role in encouraging the development of rigorous, standards-based CTE courses that meet UC/CSU admissions requirements. The CDE has supported and collaborated with the UC Office of the President, providing substantial funding for the a-g Guide Project and the UC Curriculum Integration Institute. The CDE has also promoted key industry partnerships in a number of fields, aimed at increasing the number of career pathways in those industry fields, and has created a CPA Industry Advisory Board. Such partnerships could provide a strong foundation for developing teacher externship programs to increase teachers' access to work experiences in their pathways' industry fields. Further policy initiatives could include:

1. The California Commission on Teacher Credentialing has made a number of efforts to increase the facility with which industry professionals and academic teachers can access CTE credentials (see list above). It would be timely to build on this foundation by establishing a working group to develop new legislative initiatives including incentives to increase the number of teachers capable of teaching both CTE and academic courses. In conjunction with industry partners, legislation should be developed to encourage academic teachers in pathways to acquire industry exper-

tise, and to earn CTE credentials.

2. Pay differentials and loan forgiveness have been successful strategies for increasing teacher stability and longevity in low income schools, and could be offered as incentives for both academic teachers and industry professionals who can teach dual academic/CTE courses and are willing to work in low income schools. STEM or other high-growth, high-wage pathways could be targeted.
3. Post-secondary CTE teacher training programs and professional development should be subsidized, and CTE teacher mentorship programs should be developed as part of sector-based regional strategies, to improve recruitment, training and retention of CTE teachers.
4. Continuing education programs should be developed in collaboration with industry partners to provide current academic teachers with opportunities to obtain paid experience in various industry fields, in conjunction with coursework that encourages curricular infusion of industry standards as practical applications of academic content, and provides credit toward CTE credentialing. UCOP has developed excellent models of this strategy in their UC Curriculum Integration Institutes, in which participating CTE and academic high school teachers develop model dual academic/CTE courses. Such intensive professional development should receive both UC units of credit and credit toward CTE credentialing.
5. New teacher preparation programs should be funded to provide teacher externships so that new single subject academic teachers can experience the current industry standards related to their subject area. Connecting academic instruction to practical applications should be a standard component of

secondary teacher preparation.

6. Teachers' unions should be key partners in this concerted effort to improve the number and standing of dual credentialed academic/CTE teachers.

What policies should federal legislators pursue?

Innovative federal policies can encourage more equitable access to college and career preparation, and more success at educating students to use post-secondary resources and successfully enter 21st century job markets.

1. Remove or reduce Social Security barriers for retired industry professionals seeking part-time employment as teachers in high-need areas.
2. Establish tax rebate and loan forgiveness incentive programs for professionals from industry entering career pathway programs, and for academic teachers acquiring CTE credentials.
3. Ensure that the reauthorization of Perkins funding provides greater flexibility for use of funds to promote cross-certification of teachers, and industry externships.
4. Provide federal tax incentives for industry partners who support teacher externships, training, and programs to bring industry resources and expertise to classrooms, and career technical integration into academic programs, particularly in low-income schools.
5. Provide funding for research efforts that a) document successful practices in integrating college and career preparatory curriculum, and b) address challenges in transitioning educational systems and instructional practices from separate academic and practical tracks to accessible integrated programs of study organized around fields of student interest. ▲

¹Jacques, C., & Potemski, A. (2014). *21st Century Educators; Developing and Supporting Great Career and Technical Education Teachers*. Washington, D.C.: Center on Great Teachers and Leaders.

²Mordan, B. (2012). *Retention and professional mentoring of beginning career and technical education teachers*. Dissertation. Ann Arbor.

³Purdue, R., *Certification Options for Career Technical Education*, presentation by the Commission on Teacher Credentialing for California County Superintendents Educational Services Association, November 28, 2012.

⁴Social Security, Information for Government Employees, available at: <http://www.ssa.gov/retire2/gpo-wep.htm>, accessed 11/10/2014.

⁵Purdue, R., *op. cit.*

⁶California Department of Education, *Elementary and Secondary Education Act's Teacher Requirements Resource Guide*, available at: <http://www.cde.ca.gov/nclb/sr/tq/>.

⁷California Department of Education, *Guideline Pertaining to Career Technical Education Teachers Meeting the Highly Qualified Teacher Provision*, March 26, 2007.