

Chapter 3

CURRICULUM AND INSTRUCTION

“I love my Video Production class. I am thinking this would be my career. We are learning math and how it relates to animation. In English class, we are learning how to write a press release.”

Student, Porterville High School

“Since this is a project-based school, what we’re learning in chemistry can be carried on to graphic design or English because it’s all connected to the same project...”

Student, Digital Media Academy

INTRODUCTION

Integration of educational curriculum can be defined as bringing together various fields of content knowledge and skills to make learning more engaging and meaningful for students. A potential key benefit of multiple pathways approaches is that they are designed to integrate curricular approaches and provide meaningful connections between academic learning and real-world applications.

EFFECTIVE PRACTICE

The multiple pathways approach seeks to prepare California’s students for success in a full range of postsecondary education and career opportunities. It provides integrated curriculum, so that core academic skills are integrated into career technical courses, and work-based learning and other approaches are integrated into academic courses.

Integrated teaching and learning seek to connect problem solving and inquiry across subject areas and to provide applications to academic subjects, thereby responding to the troubling question students often ask: “Why do I need to learn this?” In addition, the integration of teaching across subjects can sometimes help students find personal areas of interest. For example, by studying science in relation to problem solving in health fields, students may find an interest in the health pathway. In this way, students working on integrated projects in a multiple pathways approach may become more engaged in school.

In addition, an integrated curriculum builds on the way the brain works by connecting new learning to past experiences and knowledge. In many traditional educational approaches, students are expected to make connections between subjects on their own. Multiple pathways approaches seek to engage students in the complex functions of understanding, as well as remembering. Because understanding and remembering are based on past knowledge, using integrated curriculum within and across disciplines can help students “go deeper” to understand connections and multiple perspectives.

Integration occurs naturally in academic classes when a teacher frames a theoretical lesson around a real-world application. For example, a science teacher might include information about the swine flu virus to support a biology lesson. Likewise, integration occurs naturally in a CTE class when a video production teacher has students write scripts and storyboards using short stories from their English classes. Similarly, an agriculture teacher might have students discuss global warming in a lesson about the use of insecticides.

Integration of curriculum generally takes one of three forms: correlated curricula require the deepest level of integration and involve the alignment of two disciplines; reconstructed curricula involve merging understandings and concepts across disciplines; and, shared curricula involve teaching major concepts across disciplines (Corcoran & Silander, 2009). The integration appears to be most successful in the multiple pathways approach when a cross-curricular teaching team works together to deliver a well-planned, rigorous lesson, unit, or project that engages and motivates students by showing both relevance and relationships among subjects.

In addition, multiple pathways approaches often use cooperative learning practices, which require student groups working together, each with specific tasks that contribute to the whole effort. Not a new concept, cooperative learning requires training for both teachers and students to be effective. The research suggests that structured group learning is a promising approach that improves student achievement.

Similarly, multiple pathways approaches use problem- and project-based learning, which organizes learning around topics that students manage, using inquiry to engage with issues and questions that are relevant to their lives. In multiple pathways approaches, the projects can be, but are not always, work based. Projects may also be used to assess students' subject matter competence compared to traditional testing.

Based on practices used in current multiple pathways approaches, challenging, meaningful, integrated teaching and learning have common elements, including:

- Activities and active learning
- Adult connections
- Connections to the student's world
- Group and individual work
- Inquiry and problem solving
- Multi-levels, including special needs students
- Reflection
- Relevance
- Rigor

One approach that incorporates these concepts and could be applied to integrating academic and career technical coursework is the "Rigor/Relevance Framework" (Daggett, 2005). The framework assists educators in delivering instruction that helps to develop students' cognitive skills through applied learning experiences. The framework helps teachers develop instruction that allows students to acquire and apply knowledge within and across disciplines, to apply their knowledge to different situations, and to solve problems.

CURRENT STATUS

The UC is supporting integrated approaches through its approval of CTE courses as meeting a-g course requirements for admission to the UC.¹ Over 7,000 CTE courses have been approved to date, and the UC is committed to working with the CDE to bring this number to approximately 10,000.

From a structural perspective, California currently implements integrated curriculum and instructional approaches through academy programs. Currently, there are 469 state-funded California Partnership Academies (CPA). To receive funding, these academies must follow a model that includes elements supporting integration. California has 39 National Academy Foundation academies that adhere to a similar model. In 2001 the federal government provided funds to establish Smaller Learning Communities, and these funds have continued through 2008. In California, 223 high schools have qualified for these competitive grants, and 168 report following some form of the academy model.

CPAs provide examples of successful, high-quality, integrated academic and CTE curriculum. The CPA model requires academic and CTE teachers to work across disciplines in grades ten through twelve. The teaching team has common planning time to develop integrated units and projects for which students can earn credit in more than one course. Grading procedures and rubrics are developed jointly. Project-based learning workshops are conducted for new academies.

Examples of Integrated Approaches

The following summaries provide examples of integrated approaches to curriculum and instruction through multiple pathways programs.

The Architecture, Construction, and Engineering Academy

The Architecture, Construction, and Engineering (ACE) Academy and the Aspirations in Medical Services (AIMS) Academy at Jordan High School in Long Beach view their entire curriculum as combining college and career readiness. At ACE, mathematics classes that qualify as UC college preparatory courses are integrated with technical courses. ACE students take at least four academic courses that are integrated at various levels with subjects that help them understand architecture, construction, engineering, and technical science. During the summer students have internships related to these courses. AIMS students have similar courses related to the health occupations, with pathways in sports medicine, psychology, and animal care. Both academies include ROCP courses as electives, and students complete the required academic classes for college admission. ACE students also can earn credit from Long Beach Community College or California State University, Long Beach.

¹ For more information, see Chapter 8.

Center for Advanced Research and Technology

The Center for Advanced Research and Technology (CART) combines rigorous CTE courses with academic courses. Eleventh and twelfth grade students attend CART for half the school day, taking courses focused on the career areas of professional sciences, advanced communications, global issues, and engineering and product development. Students are actively involved in their education, working in teams to research real-world problems and discover original solutions. Academic instructors and business partners guide the work on projects. Students have access to the latest technology and are expected to include their community in integrated projects. The Clovis and Fresno school districts jointly operate CART, and even though students are bused to the site from their “home” schools, there is often a waiting list.

East San Gabriel Valley Regional Occupational Program/Training Center, West Covina, CA

The East San Gabriel Valley Regional Occupational Program/Training Center, serving seven East Los Angeles school districts, offers courses in career pathways related to arts and communication, business, health services, marketing, public services, and technology. All courses teach both career-specific skills and related academic skills. Work-based learning is offered in many classes, and student support services include career assessment, academics reinforcement, childcare, transportation, job development, job placement, and Department of Rehabilitation services. Many of the courses have articulation agreements with one or more colleges.

Existing Resources

A wide range of integrated teaching lessons and projects that are standards-based and readily available are needed. Currently, some of this curriculum is available from the following sources:

- ConnectED has integrated, problem-based curriculum units developed in partnership with the National Consortium on Health Science and Technical Education. ConnectED is also working with schools to pilot programs and project-based curriculum in arts, media, and entertainment; health sciences; law; and engineering. In addition, ConnectED has developed a pre-algebra and algebra curriculum designed to be project-based and prepare students for engineering and other pathways. ConnectEd has two free booklets, *Characteristics of Effective Integrated Curriculum* and *Designing a Multidisciplinary Integrated Curriculum*. (<http://www.connectedcalifornia.org/>).
- Ford Partnership for Advanced Studies, with the Education Development Center (EDC), has free, interdisciplinary, project-based curriculum modules. (<http://www.fordpas.org/>).
- National Academy Foundation (NAF) has a contract with WestEd to develop assessments in four areas: finance, business, engineering, and health. NAF also has curricula and projects on its website, which is limited to NAF members who pay a fee. (<http://www.naf.org>).

- Project Lead the Way is a national, nonprofit organization with integrated curriculum for engineering and biomedical science and a focus on high-level mathematics and science, integrated with technology. Schools using Project Lead the Way sign an agreement regarding standards and practices, and teachers must attend Project Lead the Way training. (<http://pltw.org>).
- The Buck Institute offers teacher workshops to design, conduct, and assess standards-based projects. The Institute has a *Project Based Learning Handbook* that academic and CTE teachers can use to integrate their disciplines. (<http://www.bie.org/>).
- Several schools and academies post curriculum and student work on websites, such as Digital Safari, Sir Francis Drake, and High Tech High.

In addition, the Career Technical Education Pathways Initiative (Senate Bill [SB] 70 [2005] and SB 1133 [2005]) funded the CTE Pathways Initiative, and CTE Online (<http://www.cteonline.org/>) and has online tools that are cross-referenced to the Standardized Testing and Reporting (STAR) program and CAHSEE tests. Its curriculum organizer allows teachers to put in a course outline with CTE standards, California Basic Educational Data System (CBEDS) codes, and information regarding board approval and CSU/UC approval. “Correlation” with academic standards is shown as “Referenced,” “Reinforced,” or “Integrated.” An icon indicates if the standard supports the STAR test or CAHSEE. Currently, approximately 25 course units are on the website.

In the same initiative, funding was provided for 42 “green” academies as part of the Construction Industry Sector Career Pathways Regional Projects. The CDE has contracted with the Career Academy Support Network (CASN), University of California, Berkeley, to find and catalogue high-quality curriculum related to “green” industries. Some of this curriculum will integrate academic and career and technical learning. The curriculum will be online on a new website CASN is designing for academies. The CDE also contracted with the Advanced Transportation Technology and Energy program at West Valley College, Saratoga, to develop curriculum related to emerging technologies. This curriculum is focused on career and technical learning, but it can be integrated with mathematics and science.

CHALLENGES

Many challenges exist to integrating a core academic curriculum with a technical core of related courses and with teacher collaboration and teaming.

Organization of High Schools

Traditionally, high schools are divided into departments by discipline, and teachers in these departments are usually housed near each other with time for department meetings. Teachers rarely have opportunity to collaborate across disciplines.

In addition, career-based courses are often located in different buildings than academic courses. ROCPs locate programs strategically within districts for the purpose of cost-effectively maximizing student access to specialized facilities and equipment offered. ROCP courses, the capstone career technical course for many high schools, are therefore sometimes located on a

separate campus with separate staff. These facility arrangements—both within a single campus and across campuses—sometimes make it difficult to integrate curriculum across academic courses and CTE.

Time

Teachers also lack the time to work together. As discussed in the CTE Needs Assessment conducted by WestEd in 2007, teachers throughout the state requested time to work with other teachers to develop curriculum and plan units of instruction.

Standards and Assessment

The current statewide benchmarks for success in schools are measured by standardized tests, and only academic standards are assessed. Many teachers of academic subjects are required to spend substantial amounts of class time ensuring that students master the skills required by the assessments. As a result, many teachers have little time or interest in including CTE standards in their instruction.

Further, while the state adopted curriculum standards in CTE that align with academic content standards (CDE 2006), the two sets of standards are still separate and distinct documents. And while the CTE curriculum framework (CDE 2007) facilitates alignment of CTE course content with academics, the academic content standards and frameworks do not reference applications of learning within any career areas.

Dearth of Existing Curricula or Means to Share Curricula

The integrated curricula and other materials developed by the NAF, Project Lead the Way, and the Ford Partnership for Advanced Studies (Ford PAS) together with the Educational Development Center, are only available to the relatively small numbers of schools in their respective networks. In addition, existing web sites do not yet serve as statewide clearinghouses for integrated curricula.

Balancing Integration with “Integrity”

The very definition of CTE and academic courses is challenged by the multiple pathways approach. While the *Education Code* and the State CTE Plan define academic and CTE courses, and databases such as the CBEDS identify courses as either “CTE” and academic, the distinction may blur with time, as “academic” courses begin to incorporate applied learning strategies, and CTE courses incorporate increasing levels of theory. While this integration can be seen positively, it can also compromise the integrity of each set of disciplines if not implemented thoughtfully. For example, some CTE educators have expressed concern that CTE courses will be “watered down,” losing the very characteristics of hands-on, applied teaching and learning that engages students, and promotes understanding of theoretical concepts, the development of problem-solving and other higher-order thinking skills, other workplace skills, and career awareness. Within a multiple pathways environment, it is fundamental that CTE not be stripped of these characteristics, but rather, that these be incorporated more widely and systematically.

At the same time, while career themes may help organize and motivate learning, students in career pathways must acquire broad transferable academic and workplace skills, with teachers highlighting this transferability. Equally important, students should not be deprived of exposure to art, music, literature, and other content that may fall outside the realm of a career area.

Teacher Credentials and Preparation

Teacher credentialing requirements and regulations differ for academic and CTE teachers² and focus on subject-matter expertise; neither academic nor CTE teachers are prepared to think across “subject-matter divides” (Rose, 2007). A related issue in some districts is the union contract and use of teacher time, class size, and work year for academic versus CTE teachers.

School and Student Scheduling

School and student schedules present another substantial challenge.³ If schools are on a six-period day, and students are attempting to fulfill the a-g requirements, completing a four-year sequence of integrated technical core classes may be difficult and, at times, impossible. Compounding the problem is the fact that many underperforming students are placed in “support” classes to remediate low scores in mathematics and reading. As a result, these students have no time for electives. Similarly, high-achieving students may prefer enrollment in an Advanced Placement class instead of a CTE class.

While students and counselors welcome additional CTE courses that meet a-g requirements, developing a four-year sequence of such courses is difficult. Some schools have tried to alleviate the scheduling problem by moving to a seven-period day or block scheduling, which allows students to enroll in seven or eight courses each semester. However, this schedule may be more costly, and given the current economic difficulties, many schools are returning to the more traditional six-period day.

Funding

Many fiscal challenges exist to the successful integration of academic and CTE learning with a multi-disciplinary team of teachers (Clark, et al., 2007). Funding streams are different for academic versus CTE courses, as are regulations for using those funds. The funds are also allocated separately by state and federal agencies. For example, Carl D. Perkins (Perkins) funding comes from the U.S. Department of Education through the CDE, with paperwork completed based on Perkins requirements. ROCPs have their own state funding and funding requirements. At the district and school levels, funds are distributed to departments, usually based on student enrollment. This web of complex funding streams and regulations makes it cumbersome for local educators.

² For more information, see Chapter 10.

³ For more information, see Chapter 6.

CONCLUSION

To prepare California's students for success in a full range of postsecondary education and career opportunities, it is essential to develop new integrated curricula for multiple pathways programs, improve access to existing curricula, and perhaps develop an online clearinghouse to share high-quality, integrated lessons, units, projects, and best practices with school districts throughout the state.

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