



White Paper



Career & Technical Education:

How are you addressing the growing need?

“The fastest way for us to ‘get up and running’ was to move online with Edmentum’s CTE courses. We expect to grow to 10,000 students or 85 percent of high school enrollment by next year.”

Elaine Plybon

Facilitator of Transformative Learning, Keller ISD

Introduction

According to the U.S. Bureau of Labor Statistics' *Occupational Outlook Handbook*, many of the fastest-growing and highest-paying jobs through 2022 will be in fields like healthcare, the skilled trades, information technology (IT), other STEM-related fields, and marketing (U.S. Department of Labor, 2014a). At the same time, these are often the jobs that employers struggle to fill (Manpower Group, 2014; DOL, 2014b). Quality Career & Technical Education (CTE) programs play a critical role in training workers in these areas.

The Office of Career, Technical, and Adult Education predicts 55 million job openings in the economy through 2020; 24 million openings will be in newly created jobs, and 31 million openings will be due to baby boomer retirements (Carnevale, Smith, & Strohl, 2013).

Table 1: Wage and unemployment rate by education level for 2013

Education Level	Some HS, No Diploma	High School Diploma	Some College, No Degree	Associate Degree	Bachelor's Degree	Master's Degree	Professional Degree	Doctoral Degree
Median Yearly Earnings	\$23,600	\$32,600	\$36,400	\$38,900	\$55,400	\$66,500	\$85,700	\$81,200
Unemployment Rate	11%	7.5%	7.0%	5.4%	4.0%	3.4%	2.3%	2.2%

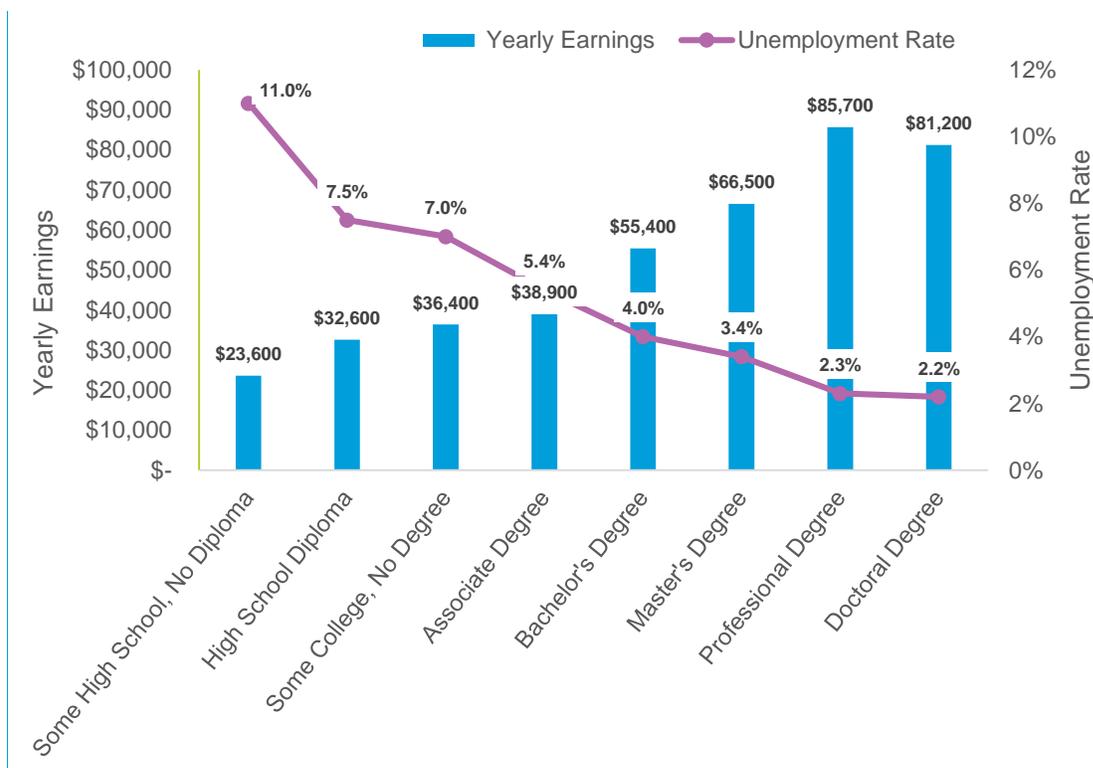


Figure 1: Wage and unemployment rate by education level for 2013
 Source: Current Population Survey, U.S. Department of Labor, U.S. Bureau of Labor Statistics
 Note: Data are for persons age 25 and over. Earnings are for full-time wage and salary workers.

CTE is designed to help students adapt to rapidly changing, not-so-predictable turns of future economic conditions. The goal of the Perkins IV Act, which supports CTE, is to provide students with academic and skill-related training that leads to technical skill proficiency and/or an industry-recognized credential, certificate, or associate degree (Carl D. Perkins Career and Technical Education Improvement Act of 2006, section 3.5).

This paper explores the evolution of vocational education in a system that supports students for life, preparing them for current and future technological advances that will force them to think, work, and play in ways we have yet to imagine. We will also examine the resources available to support the CTE model and explore the need for educators and business owners to participate in the process. Finally, we will examine how Edmentum’s research and analysis of CTE and its longstanding history of online course development provides a strong foundation for CTE offerings. Aligned to state standards, Edmentum’s CTE courses encompass the National Career Cluster® Framework, and support Career Pathways to help students navigate their way to various career options. Edmentum offers courses that are in highest demand across the nation, meeting the needs of educators and the economy to deliver forward-looking learning for secondary students.

Table 2: *The Transformation of Career & Technical Education*

CTE Historically	CTE Now
Designed for High School	Designed to Bridge the Link Between High School & Postsecondary Education
6–7 Program Areas	16 Clusters 79 Career Paths
Not Standardized	Common Career & Technical Core Standards
Non-Academically Oriented	Supports & Reinforces Academic Learning
Ends at High School	Continual Opportunities for Stackable Certificates & Degrees

Establishing the need for CTE

The current challenge of high school graduates represents a change in the U.S. economy, with rising educational requirements and a smaller share of jobs for high school-educated workers. In 2007, fewer than two out of five workers had a high school diploma or less (Carnevale, Smith, Stone, et al., 2011). By 2020, two out of three jobs will require some postsecondary education or training (Carnevale, Smith, & Strohl, 2013). As the 21st-century workforce changes, so does the population of students engaged in CTE. CTE students today enroll in courses across the academic spectrum (Carnevale, Jayasundera, & Hanson, 2012; CCSSO Task Force on Improving Career Readiness, 2014).

Schargel and Smink (2001) identified five potential benefits of CTE courses. These benefits include enhancement of students' motivation and academic achievement, increased personal and social competence related to work in general, a broad understanding of an occupation or industry, career exploration and planning, and acquisition of knowledge or skills related to employment in particular occupations or more generic work competencies.

What does it mean to earn a certificate?

 The number of certificates awarded has skyrocketed more than 800 percent over the past 30 years. 

Carnevale, Rose, & Hanson, 2012, p. 4

Certificates are categorized according to time to earn—those that require 1) less than a year, 2) one year but less than two, or 3) two years but less than four. Certificates are offered within postsecondary institutions and are related to particular programs of study (POS). If aligned appropriately, the knowledge required to earn a certificate can begin in high school under a CTE POS. Besides positioning the country to be more globally competitive, research indicates that just one more year of education can increase wage potential dramatically, thus improving quality of life and, simultaneously, the economy (Carnevale, 2012).

Edmentum CTE

As of August 2014, there were 59,379 Edmentum CTE courses assigned to students across the country. Edmentum's CTE courses are rigorously designed to support the CTE pathways and can be characterized as leading-edge because they:

- Are aligned to the CTE national standards and are embedded in customized, state-designed pathways to career and workplace options
- Connect to students' real-life experiences and help them discover and prepare for their life's work
- Engage students in active learning experiences and skill attainment
- Acknowledge and appeal to the needs of today's tech-savvy students with mobile-friendly, anytime, anywhere access
- Provide substantial breadth and depth of content
- Offer a selection of electives related to the Career Clusters®

Edmentum’s CTE library, with a link to course descriptions, can be viewed at <http://www.edmentum.com/course-catalog>. All new CTE courses are developed to meet the latest Edmentum course standards. All previously released CTE courses will be updated to these course standards with:

- New streamlined workflow and a new interface
- New technology-enhanced (TE) assessments and interactivity

A substantial number of new courses were added to the CTE Library in spring and fall of 2014, with more being released in the fall of 2015. With these course additions, the CTE Library will offer 80 semester courses addressed to meet state CTE standards, including two key foundational courses: *Career Explorations* and *Essential Career Skills*. These courses include introductory “principles” for all 16 Career Clusters® recognized by the National Association of State Directors of Career Technical Education Consortium (NASDCTEC). They also provide deep programs of study for popular courses and clusters where online learning is especially well-suited.

Edmentum’s course development process

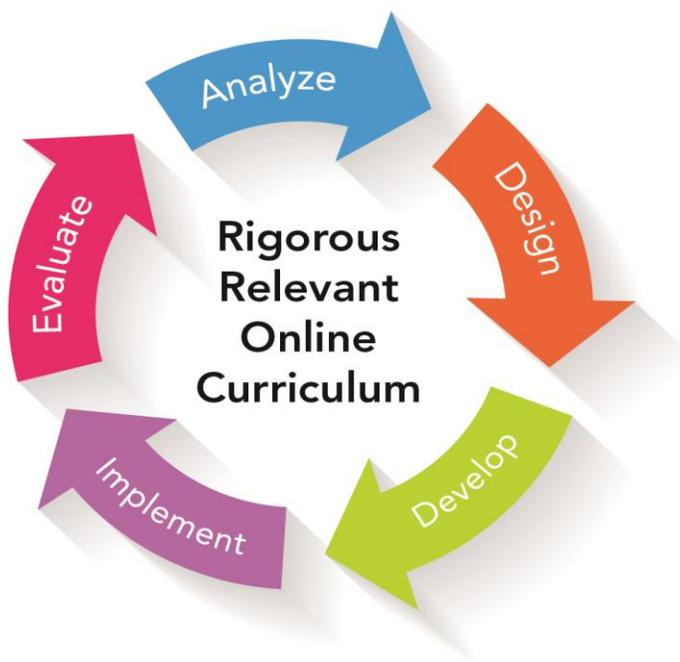


Figure 1: ADDIE: Instruction System Design Model

Edmentum follows an updated version of the ADDIE instructional systems design model to guide CTE course development. ADDIE is an acronym for “analyze, design, develop, implement, and evaluate.” Each phase of ADDIE has a set of guiding questions to standardize the process and provide for a comprehensive review of the ongoing project.

Analyze: Clarifies the instructional goals and identifies the learning environment and the expected learner's knowledge and skills

Design: Creates a blueprint for content, subject matter analysis, assessment instruments, lesson planning, and media selection

Develop: Assembles blueprints, integrates technologies, debugs materials and procedures, and iteratively reviews products

Implement: Develops materials needed for training facilitators and users and evaluates the implementation

Evaluate: Applies and reviews formative and summative evaluation findings

Edmentum’s Plato Courseware uses a mastery-based model to build the content. Each learning module, or lesson, focuses on one or more standards and includes: an introduction to the new material, a chance to practice or apply new knowledge, and an opportunity to demonstrate mastery before progressing to the next module. This structure is built into units of related material and includes pretests to assess prior knowledge and posttests and end-of-semester tests to confirm mastery for broader levels of content beyond the lesson. Table 3, is a visualization of the CTE course design.

Table 3: Edmentum CTE course structure

Course Structure	Unit Structure	Lesson Structure
<p>Student Orientation</p> <p>Course Syllabus</p> <p>Unit 1 →</p> <p>Unit 2</p> <p>Unit 3</p> <p>...</p> <p>Unit X</p> <p>End of Semester Test</p>	<p>Unit Pretest (optional)</p> <p>Online Discussion</p> <p>Lesson 1 →</p> <p>Lesson 2</p> <p>Lesson 3</p> <p>...</p> <p>Lesson X</p> <p>Review Game</p> <p>Unit Activity</p> <p>Unit Posttest</p>	<p>Tutorial <i>(includes embedded Lesson Activities)</i></p> <p>Mastery Test</p>
<p>Student orientation provides students with the information they need to begin their online coursework productively.</p> <p>The Course syllabus enables students to understand and plan for learning activities ahead of time.</p> <p>Units organize learning into related knowledge clusters and a meaningful sequence.</p> <p>End-of-semester tests provide a summative measure of students' mastery and retention across every lesson in the course.</p>	<p>Unit pretests assess previous knowledge and may be used in certain circumstances to automatically exempt students from lessons they've already mastered.</p> <p>Online discussions enable students to discuss and debate. Group discussion requires students to synthesize knowledge, apply critical-thinking skills, form and support ideas, and respond to the ideas of others.</p> <p>Lessons provide a rich learning experience and engaged activity, targeted toward specific learning standards and practices.</p> <p>Unit activities (and course activities) enable students to demonstrate higher levels of skill by completing a rich task and submitting the resulting project, paper, essay, data, research, or presentation to the teacher via an online digital drop box.</p> <p>Unit posttests assess topic-level mastery at the end of each unit.</p>	<p>Tutorials help learners acquire and build knowledge. They include a variety of media, interactive practice, and applications. They also contain one or more extended Lesson Activities—rich learning projects that support in-depth knowledge building.</p> <p>Mastery tests measure whether students have mastered lesson objectives and are prepared to move on to the next lesson.</p>

Options to consider in building a quality CTE program of study

Student Learning Options

Edmentum's flexible design supports a number of customized learning options that take into account a student's level of existing knowledge, the number of subject area courses taken at one time, and the volume and nature of the standards addressed. These flexible model options include:

- Teacher-led classroom models where classes begin, end, and are paced on school timelines
- Modules where students work at their own pace with feedback and assistance by instructors
- Learning models where pretests can be used to identify existing knowledge and exempt previously mastered content

The flexibility of these CTE courses allows instructors to use individual units or lessons to support classroom learning, aside from attaining credit for a CTE course. Lessons can also be used to supplement other CTE instructional programs.

Supervision Options

Edmentum's CTE courses are designed to require minimum supervision, but the value of a quality teacher and/or paraprofessional who monitors student progress, provides learning insights, and assists students as needed in mastering concepts cannot be overstated. Instructional assistance can be provided in a virtual setting, a blended environment, or a traditional classroom.

Anywhere, Anytime Learning

CTE coursework can be offered in traditional classrooms settings, lab settings, virtual settings, or any combination. Students can prepare for learning at home and then obtain additional support from their teachers at school. Courses can be arranged to be synchronous or asynchronous, and all of Edmentum's CTE courses are mobile ready.

Apprenticeships, Internships, Work-Based Learning, Virtual Career Exploration

Beyond curriculum, other key components of CTE are apprenticeships, internships, or high-stakes, hands-on laboratory work under supervised conditions. These activities require an authentic physical environment in order to practice the occupational skill or to learn general workplace skills that employers require. The needs of the local partners can drive the development of new courses that are specially customized for the environment.

Ideally, occupational practice should be supervised by a manager within the workplace as well as the teacher in the school. Some teachers give assignments that are directly related to the partnership work in progress. To build successful business partnerships, schools, businesses, and community organizations must design solutions for the students who will soon be the labor force of the nation. Apprenticeships are especially important in high-stakes, high-risk jobs, such as those in the medical field, law enforcement, or firefighting.

Student Organizations

National and local industry-related student organizations provide opportunities for students to meet with others who are on the same or similar pathways. These organizations offer practice in industry-related skills, motivation and encouragement to graduate, leadership opportunities, competitions, and teamwork experiences. Several such organizations operate across the country.

A model implementation using Edmentum CTE courses

Table 4: Keller ISD by the numbers

Keller ISD by the Numbers	
White	61%
Hispanic	19%
African American	8%
Asian	8%
Native American/2+ Races	4%
Economically Disadvantaged	22%
Gifted and Talented	12%
Limited English Proficient	6%
Special Education	8%
Graduation Rate	94%
Attendance Rate	96%
College Bound	73%

The Keller Independent School District, in Keller, Texas, encompasses portions of nine cities and includes 39 campuses. Three years ago, only four high school campuses offered CTE. At that time, each high school operated its own level of adherence to the CTE program, which resulted in serious alignment issues across the district. One school offered an agriculture program; another offered law enforcement, and so on. With such a localized arrangement, only students within a given school could take advantage of that particular CTE offering.

In 2013, Texas House Bill 5 (HB5) launched significant changes around graduation requirements in the state by allowing districts to offer courses that lead to industry-recognized credentials, giving students the flexibility of either pursuing a traditional path into colleges and universities or moving directly into the workforce. Under HB5, credits are arranged into five endorsement categories: STEM, Business and Industry, Arts and Humanities, Public Services, and Multidisciplinary Studies. The bill also requires districts to directly partner with institutions of higher education to provide courses in college prep math and English language arts. HB5 requires all students to graduate with at least one of these endorsements.

District Alignment

Prior to the 2012–2013 school year, Keller hired a new superintendent, Dr. Randy Reid, who embarked upon a number of innovative changes across the district. One such change included a reorganization of staff and curriculum to create a vertically structured organization. In a vertically aligned system, internal positions are organized by functionality so that everyone understands his or her role in helping to achieve the district's goals. The system has little overlapping of tasks and creates an efficient model of operation. In addition, the district's curriculum was examined for direct and vertical alignment to state standards. Pilot tests were conducted on student feeder patterns across schools to check for gaps in curriculum and services.

CTE Organization and Implementation

To accomplish the CTE reorganization, Superintendent Reid engaged two experienced administrators to design and complete the task: Casey Stone, Director of Career and Technical Education, Innovation, and Learning; and Elaine Plybon, Facilitator of Transformative Learning. Their first goal was to open all five graduation endorsements to all high school students, thus providing a broad number of opportunities to graduate within an endorsement category. Although some new CTE faculty was hired, "funding did not allow for hiring a CTE instructor in every class," said Stone. Instead, 12 new CTE online facilitators/teachers were engaged to support the curriculum change. Each school was able to configure its own plan for placement of the facilitators. A new high school, New Directions High School, was opened for students who desire a less traditional approach to graduation. Six middle schools also joined in the CTE expansion, allowing 8th graders to begin earning credits for graduation.

Adding Edmentum's CTE Courses

The district discovered early that no single vendor could provide everything needed to make the CTE programs work. "We had to build many partnerships to build a comprehensive system for students," said Stone. "The nature of CTE is so dynamic. When one set of course requirements are met, another one comes up. It's a moving target."

Given the short timeline and limited budget, the fastest way to get up and running was to shift to online learning with Edmentum's CTE courses. "Online learning was a fantastic way to expand," said Plybon, who noted that the online courses opened other unexpected doors. "Students who are homebound or who need developmental education could access the Edmentum CTE courses online, having new avenues to support their journey to graduation."

Professional Development

Training in online instructional delivery was also critical to Keller's success. Three training sessions were provided in three-month increments. "For the first year, the district provided a protective umbrella in each room to support the Kellerized e-model," said Plybon, referring to the placement of the facilitators. "We wanted to teach everyone to be a successful online educator. Then, we opened the birdcage and let the birds fly." By January, a community of online teachers joined together to share ideas and build plans for the future.

Communities of Practice

Partnerships with businesses and postsecondary institutions provide important motivation, training, and discussion topics for students. Tarrant County College in Fort Worth is actively engaged as a partner with Keller ISD, and over time, the number of partnerships will expand to offer work-based learning, as well as paid and unpaid career-related internships. For now, students participate in career-related groups, such as Distributive Education Clubs of America (DECA) and Family Career and Community Leaders of America (FCCLA), which they tweet about regularly on the district's CTE website.

CTE Enrollment and Growth

The program has already seen remarkable growth. In 2013–2014, Keller enrolled 5,700 students in CTE classes. In the fall of 2014, enrollment reached 8,300. "We are expecting to grow to 10,000 students or 85 percent of high school enrollment by next year," said Stone. "We aren't forcing anyone to take the new Edmentum online courses. We are fostering a growth of use. We expect to see a new graduation model with all students getting at least one, but possibly more than one, endorsement listed on their diploma."

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