

The Intersection of **CAREER READINESS AND DIGITAL LEARNING**

AUGUST 2021

Introduction

Preparing students for jobs and careers has long been considered a key goal of public education. Although other benefits, such as fostering a healthy democracy and functioning society, are also critically important, education is commonly linked to students' future jobs and careers, and more broadly to the economic health of the country. As one example, consider the extent to which business and business-oriented organizations, such as chambers of commerce, are considered key stakeholders of school districts in many areas.

A key question, therefore, has accompanied the rise of online and hybrid learning. Can online schools, and digital learning more broadly, support career readiness (CR) and career and technical education (CTE)?

This study seeks to answer that question. It first provides a brief background on the forms of digital learning, drawing on the experience and publications of the Digital Learning Collaborative, among other sources. It then provides a similarly brief history of CTE. These two primers form the background to a more detailed discussion of the intersection of digital learning, CR, and CTE, which comprises section three. Finally, this report presents short profiles of online schools and courses that are supporting career education. These examples include fully online schools, online course providers such as state virtual schools, and the use of online courses and hybrid learning environments in mainstream school districts.

As explained in this report, digital learning does in fact support career study, in numerous valuable ways. Online schools and courses are creating new, innovative, and generally underappreciated synergies between schools and career exploration for students. Digital learning is increasing access to CR and CTE courses of study for many students who otherwise would not have access to these options, while site-based internships and other programs are providing real-world experience to students in online and hybrid schools.

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About the Digital Learning Collaborative

The Digital Learning Collaborative (DLC) is a membership group dedicated to exploring, producing, and disseminating data, information, news, and best practices in K–12 digital learning.

Our current members include school districts, intermediate units, public agencies, non-profit organizations, and companies.

Collaborative activities are supported financially by annual membership fees. We accept foundations as members but do not seek nor accept foundation funding at levels higher than members.

The Evergreen Education Group manages the Collaborative. DLC members determine the topics that we explore, via monthly web meetings and individual discussions. Topics include the following:

- Best practices and strategies for success in a variety of online and blended learning settings (e.g., mainstream schools and classrooms, alternative education, online schools, credit recovery programs)
- Honest explorations and analysis of challenges and pitfalls that have plagued digital learning
- Implementation case studies exploring the varied settings discussed above
- Discussion of successful online content and technology platforms supporting digital learning
- Identification of professional learning needs for teachers and strategies for success
- Policy issues including state funding and accountability systems, which benefit or hinder best practices in supporting students
- Annual reports documenting key issues in digital learning, including growth and trends

DLC Core Principles

Members of the Digital Learning Collaborative believe the following:

- Online, blended, and digital learning encompass a wide range of schools, instructional strategies, and practices that may be implemented across a district, network of schools, single school, or individual classroom.
- Existing schools and programs demonstrate that many of these instructional strategies and practices are helping K–12 schools and students improve educational opportunities and outcomes.
- Online, blended, and digital learning encompass practices that may be implemented well or poorly. Therefore, the theoretical question “does online/blended/digital learning work” is nonsensical in the same way as asking “do traditional schools work?”
- The technology used in online, blended, and digital learning always supports teachers and other professional adults who work with students in a variety of ways. There are no examples of successful, scalable educational programs in the United States that operate without teachers.
- Although K–12 digital learning has a track record that extends over more than two decades, significant myths and misunderstandings are common. The DLC exists in part to counter these myths and replace them with data and accurate information.
- Many different types of organizations have a valuable role to play in improving education. Digital tools, resources, and instruction are created and implemented by a wide variety of organizations that include individual schools, districts, regional public agencies, state agencies, private non-profit organizations, and for-profit companies.

Individual Collaborative members support these principles. Collaborative documents and resources build on these principles, but may not always reflect the views of individual DLC members.

Definitions and terms

This report uses several key terms, which are defined below. The definitions for online learning, blended learning, digital learning, and hybrid schools are from the Digital Learning Collaborative website.¹

Online learning encompasses a wide range of educational activities, tools, and resources that are delivered via the Internet. These can be schools in which the large majority of curriculum is delivered online, and interaction between students and teachers, and between students, is mostly or entirely at a distance. Online learning can be the online component of specific activities in mainstream classrooms, such as students using instructional math software for an hour per week in a class that otherwise uses face-to-face teaching, group activities, and a range of similar approaches that are common in traditional schools.

Blended learning describes any combination of online learning and site-based, face-to-face education. Although the DLC believes that student agency and the use of student data in instruction are valuable, we do not include these elements in our characterization of blended learning. Blended learning that substitutes for a traditional instructional activity may be unlikely to impact outcomes, while a use of blended learning that innovates instruction and student activity is more likely to have a positive impact. Both of these, however, may be characterized as blended learning.

Digital learning encompasses online learning and blended learning and refers to any use of either of these.

Hybrid schools combine online and face-to-face instruction and meeting the following characteristics:

- The school enrolls students, receives FTE funding (ADA/ADM/PPOR etc), and is listed as a school by NCES.
- The school has a physical location which students regularly attend for instructional purposes.
- The large majority of students must take part in learning activities at the physical location at least occasionally.
- Students are not required to attend the physical campus on a schedule that approaches a regular school schedule. The school might require students to be on campus a couple of days per week but never five days per week.

Emergency remote learning is an unplanned method for teaching at a distance when, due to extenuating circumstances, such as natural disasters and pandemics, teachers are not able to be physically located in a classroom with their students.

Career Technical Education (CTE) is a “cutting-edge, rigorous, and relevant approach to preparing youth and adults for a wide range of high-wage, high-skill, high-demand careers.”²

College and Career Readiness (CCR) “refers to the knowledge, skills, and dispositions needed to be successful in postsecondary education and/or training that lead to gainful employment. Today’s workplace requires that all workers be lifelong learners in order to advance in their careers.”³

¹ <https://www.digitalllearningcollab.com/key-terms>

² <https://www.acteonline.org/why-cte/what-is-cte/>

³ <https://www.sreb.org/definitions-college-and-career-readiness>

Digital learning overview

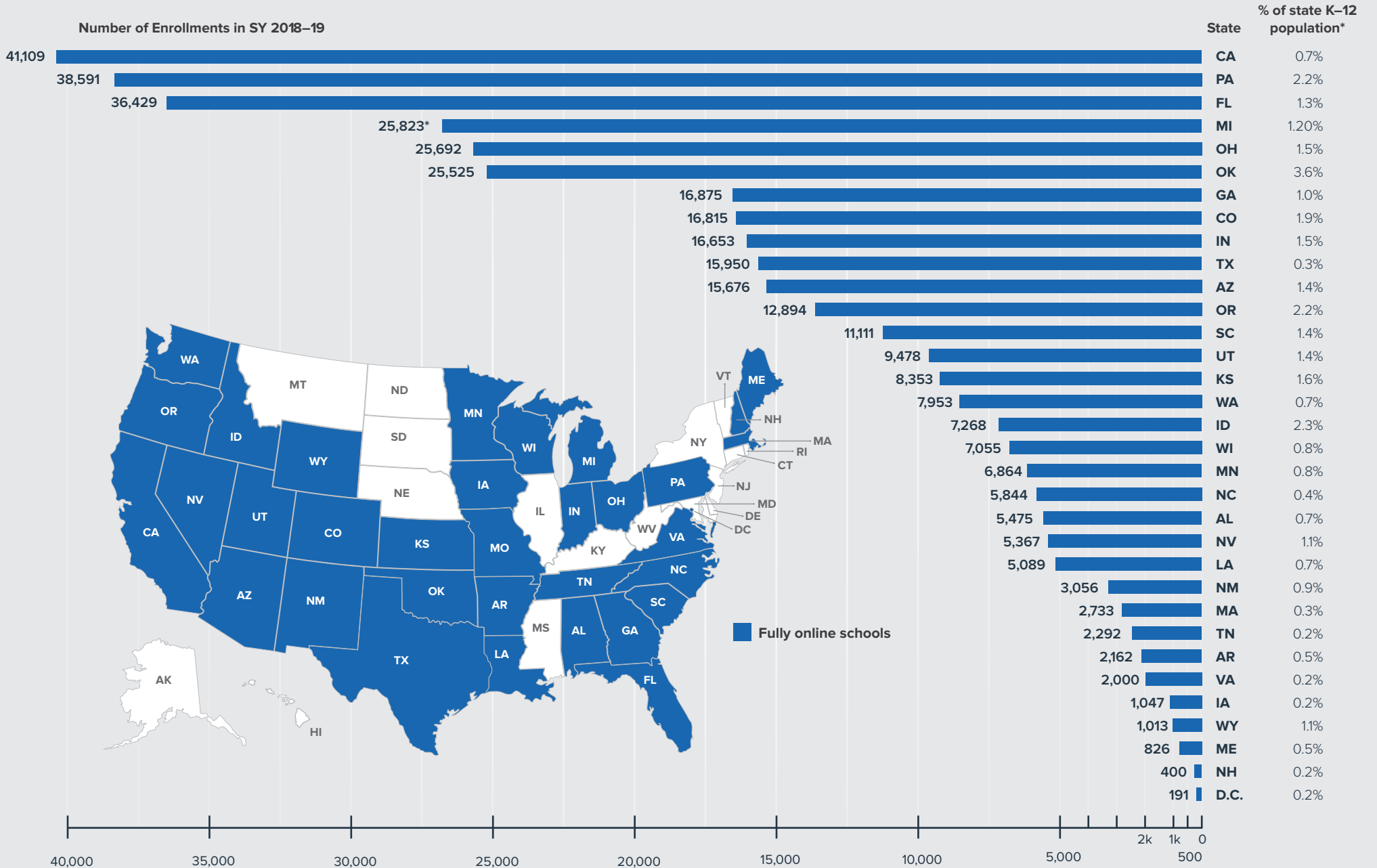
In the past year of school closures, remote learning became ubiquitous. Even before the pandemic, however, millions of students were accessing digital learning, including in the following formats:

- Several hundred thousand students across 32 states were enrolled in full-time, public, online schools in fall 2019.⁴ Some of these schools were charter schools; others were run as part of mainstream school districts. Some enrolled students from across entire states; others were for students enrolled in a single district in which the students reside. These schools deliver instruction via both real-time and asynchronous methods, including live video, recorded video, text, graphics, animations, text, and other materials.
- Several million students took one or a few online courses while enrolled in a mainstream school. Providers of these courses include companies, state virtual schools, and districts serving their own students and/or other districts. The largest state virtual school, the Florida Virtual School (FLVS), alone delivered more than a half million course enrollments in school year 2019–2020. During the pandemic year, FLVS course enrollments rose to well over 600,000.
- Tens of millions of students in mainstream schools accessed online tools, content, and resources from school and/or home. The spread of low-priced computers has made such devices common in schools, especially in high schools, and to a slightly lesser extent middle schools. Tablets have become increasingly common in elementary schools. These devices support the in-class use of learning management systems, math and reading software, and the educational equivalent of work-based productivity software.

⁴ All data in this section are from Digital Learning Collaborative. (2020). Snapshot 2020: A review of K–12 online, blended, and digital learning. Retrieved from <https://www.digitalllearningcollab.com>, except for the most recent Florida Virtual School enrollment numbers, which are from unpublished DLC research.

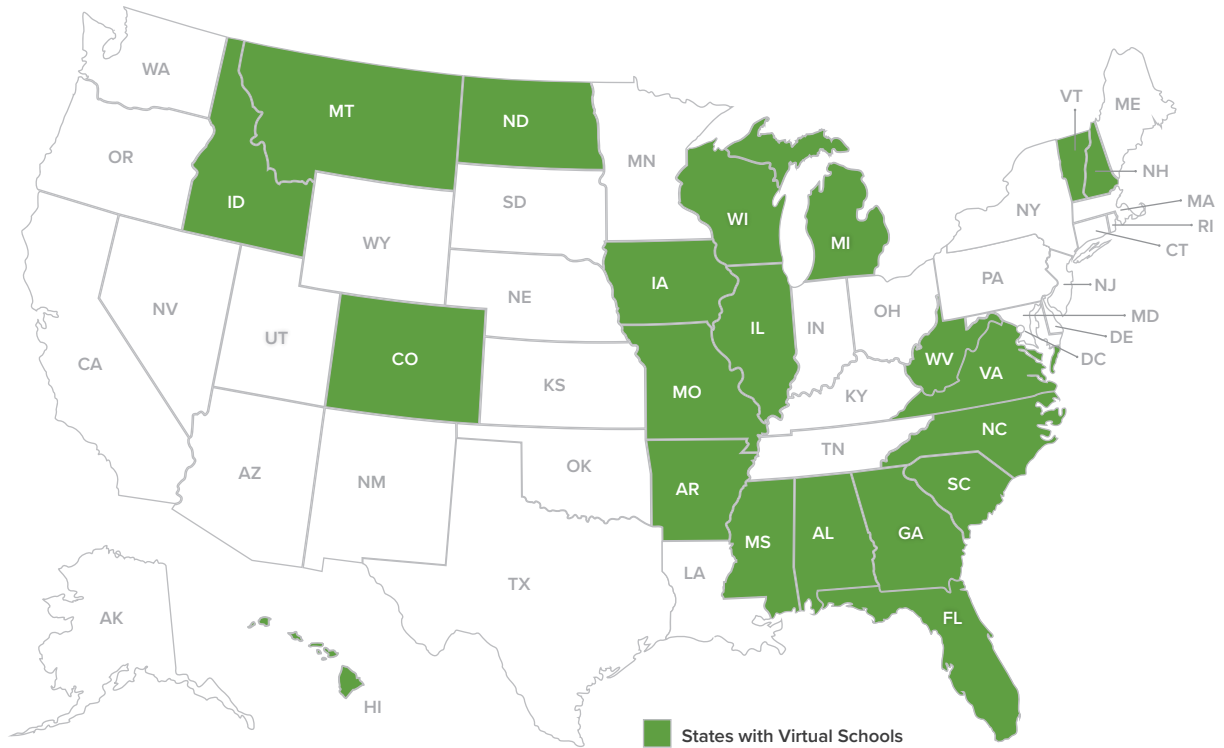
States with Statewide Fully Online Schools

FIGURE 1: States with statewide fully online schools as of the 2019-2020 school year



*number from SY 2017–18

FIGURE 2: States with state virtual schools as of the 2019–2020 school year



Career Readiness and Career and Technical Education Overview

Digital learning is relatively new; CR and CTE are not. National efforts to create and support CTE date back more than a century. In 1917, Congress passed the Smith-Hughes National Vocational Education Act, which was an early step towards making CTE a critical component of K-16 education in the United States. Sixty-seven years later, the Carl D. Perkins Vocational and Applied Technology Education Act of 1984 (Perkins) was passed.^{5,6,7,8}

Built on the foundation of the career higher education market, CTE was established to prepare learners for high-wage, high-skills, high-demand careers. Katie Fitzgerald, Director of Communications and Membership for Advance CTE, shared, “Vocational education’s history is grounded in preparing individuals for the workforce. That is still a relevant purpose today, however, in the early 1900s, the majority of jobs required a high school degree or less while today’s jobs require some postsecondary education.”

5 Gordon, H. R. D. (1999). *The History and Growth of Career and Technical Education in America*. Long Grove, IL: Waveland Press, Inc.

6 Hyslop, A. (2018). Perkins V: The Official Guide to the Strengthening Career and Technical Education for the 21st Century Act. Association for Career & Technical Education.

7 [U.S. Department of Education](https://www.ed.gov/) Division of Academic and Technical Education

8 [Congress.gov](https://www.congress.gov/)

However, the U.S. economy was quite different at influential times in the development of CTE than it is now. The post-World War II decades were notable as a time in which a white male could earn a competitive middle-class wage based on a combination of a high school diploma and job skills—many of which would not change quickly over the years. These decades were clearly not nearly as beneficial for workers who were not white and male, but both economic and political structures (e.g., both management and labor in large and influential companies) reflected the influence and expectations of white men—and to a lesser extent other men—with the perceived goal of single earners being able to support a family at a middle-class standard of living.

This view of the economy persisted well into the second half of the 20th century, even as economic conditions were shifting. With the growth and spread of computers and other new technologies, CTE slowly shifted to encompass a wider range of skills. Barry King, Director of Career and Technical Education at Insight PA Cyber Charter School, explained that “CTE evolved out of vocational technical, which some people had viewed negatively because it was very closely associated with learning very specific skills or trades.” Both Fitzgerald and King expressed that the ‘votech’ stigma is slowly dissolving. A driver and sign of this change is the way in which the term “College and Career Readiness” has largely replaced “CTE” in common usage. Tied to CCR is the concept that few, if any, people will work a significant number of years without learning new skills. The idea of “life-long learning” has become so common as to be passé, but the concept truly marks a major shift from the way CTE was perceived years ago. In fact, while CTE and CCR are sometimes seen as separate concepts in policy and funding, many longtime CTE professionals see them logically and progressively fusing together. Fitzgerald emphasized, “CTE and CCR have similar goals to prepare students for career and college, including options for dual and concurrent enrollment, industry certifications, contextualized academics, and more.” This view contributed to the development of elements of federal policies, such as the Elementary and Secondary Education Act, in which state performance frameworks for school districts focus on graduating students who are college and career ready.

These concepts have been evolving for decades and continue to shift. Based on these ideas, the CTE field started thinking critically about what it needed to do. Fitzgerald explained, “Since the community changed its name from Vocational Education to Career Technical Education and the inception of the National Career Clusters Framework®, the CTE community has embraced the commitment to career pathways and a focus on lifelong learning, with strong on- and off-ramps.” This focus on lifelong learning has been a significant pivot for the field. In 2018, research conducted by Georgetown University’s Center on Education and the Workforce found that students with solely a high school diploma or less were not set up for competitive jobs,⁹ which reinforces the need for most learners to earn some type of PS credential, which CTE can lead to.

Elements of CTE

Recent developments have further strengthened the College and Career Readiness field. For instance, the Association for Career & Technical Education (ACTE), the “largest national education association dedicated to the advancement of education that prepares youth and adults for careers,”¹⁰ established the Quality CTE

9 <https://cew.georgetown.edu/wp-content/uploads/3ways-FR.pdf>

10 <https://www.acteonline.org/why-cte/what-is-cte/acte-history/>

Program of Study Framework. This framework consists of 12 elements and 92 criteria that together define a comprehensive, research-based CTE program.¹¹ The 12 elements are:

1. Standards-aligned and Integrated Curriculum
2. Sequencing and Articulation
3. Student Assessment
4. Prepared and Effective Program Staff
5. Engaging Instruction
6. Access and Equity
7. Facilities, Equipment, Technology, and Materials
8. Business and Community Partnerships
9. Student Career Development
10. Career and Technical Student Organizations (CTSOs)
11. Work-based Learning
12. Data and Program Improvement

These 12 elements are used to determine state funding appropriations for CTE programs. CTE is funded primarily through Perkins, and some states take advantage of additional funding available through the Workforce Innovation and Opportunity Act. Out of the total \$1.3 billion federal CTE allocations, approximately 15% goes to national programs and the rest to states. CTE policy, legislation, and funding information is published in an annual report by ACTE's sister organization, Advance CTE, which is made up of state CTE directors.¹²

Another key recent development was the authorization of the 2018 Strengthening Career and Technical Education for the 21st Century Act, which requires every state to use the 2018 Quality CTE Program of Study Framework as a guide to create an annual performance standards plan to be approved by the U.S. Department of Education through the Office of Career and Technical Education. Each state has a different plan based on its needs. This performance standards plan is then used as a requirement for LEAs to develop their annual Perkins plan. All LEAs are audited annually by their state agency that is charged with oversight.

Most CTE programs, curriculum, and instructional design use the National Career Clusters Framework¹³ as a tool to organize and structure the content areas covered under the Pathways to College & Career Readiness. Sixteen Career Clusters represent 79 Career Pathways:

1. [Agriculture, Food & Natural Resources](#)
2. [Architecture & Construction](#)
3. [Arts, A/V Technology & Communications](#)
4. [Business Management & Administration](#)

¹¹ <https://www.acteonline.org/wp-content/uploads/2019/01/HighQualityCTEFramework2018.pdf>

¹² <https://careertech.org/resource/series/state-policies-impacting-cte-year-review>

¹³ <https://careertech.org/Career-Clusters>

5. [Education & Training](#)
6. [Finance](#)
7. [Government & Public Administration](#)
8. [Health Science](#)
9. [Hospitality & Tourism](#)
10. [Human Services](#)
11. [Information Technology](#)
12. [Law, Public Safety, Corrections & Security](#)
13. [Manufacturing](#)
14. [Marketing](#)
15. [Science, Technology, Engineering & Mathematics](#)
16. [Transportation, Distribution & Logistics](#)

CTE program offerings vary from one school to the next, as individual schools typically offer a subset of pathways, clusters, and courses. For instance, the following two figures illustrate the varied offerings from the Cyber Academy of South Carolina (Figure 3) and Virtual Arkansas (Figure 4), respectively.

FIGURE 3: Cyber Academy of South Carolina’s Career Clusters, Pathways, and Courses

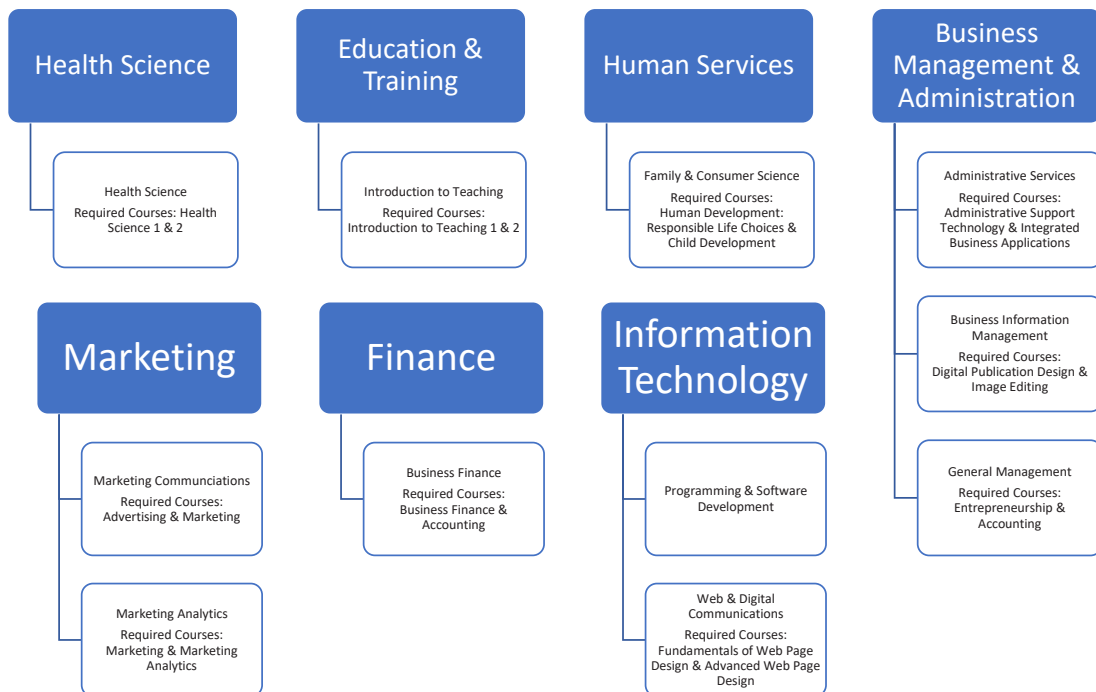



FIGURE 4: Virtual Arkansas' Career Clusters and Courses



VIRTUAL ARKANSAS

CTE CAREER CLUSTERS & COURSES

- AGRICULTURE, FOOD, AND NATURAL RESOURCES**
 - AGRIBUSINESS MANAGEMENT
- ARTS, A/V, COMMUNICATION AND TECHNOLOGY**
 - DIGITAL PHOTOGRAPHY I
 - DIGITAL PHOTOGRAPHY II
 - DIGITAL PHOTOGRAPHY III
- CAREER EXPLORATION AND PREPARATION**
 - COLLEGE AND CAREER READINESS
 - CAREER READINESS
 - WORK READY
- EDUCATION AND TRAINING**
 - LIFE SPAN DEVELOPMENT
 - ORIENTATION TO TEACHING I
- FINANCE**
 - SURVEY OF BUSINESS
 - COMPUTERIZED ACCOUNTING I
 - COMPUTERIZED ACCOUNTING II
- HEALTH SCIENCE**
 - FOUNDATIONS OF HEALTH CARE
 - HUMAN ANATOMY AND PHYSIOLOGY
 - ABNORMAL PSYCHOLOGY
 - FOUNDATIONS OF SPORTS MEDICINE
 - HUMAN BEHAVIOR AND DISORDERS
 - MEDICAL TERMINOLOGY
 - PATHOLOGY
- HOSPITALITY AND TOURISM**
 - SURVEY OF BUSINESS
 - TOURISM INDUSTRY MANAGEMENT
 - ARKANSAS HOSPITALITY AND TOURISM
- HUMAN SERVICES**
 - FASHION MERCHANDISING
 - PERSONAL FINANCE
- INFORMATION TECHNOLOGY**
 - PROGRAMMING YEAR I
 - PROGRAMMING YEAR II
 - PROGRAMMING YEAR III
 - CYBERSECURITY YEAR I
 - CYBERSECURITY YEAR II
 - CYBERSECURITY YEAR III
 - DATA SCIENCE YEAR I
- LAW, PUBLIC SAFETY, CORRECTIONS AND SECURITY**
 - INTRODUCTION TO CRIMINAL JUSTICE
 - CRIMINAL LAW
- STEM**
 - INNOVATIONS IN SCIENCE AND TECHNOLOGY I
 - UNMANNED AERIAL SYSTEMS I
- TRANSPORTATION, DISTRIBUTION, AND LOGISTICS**
 - FUNDAMENTALS OF FLIGHT
 - AIRPORTS, AIRSPACE, AND WEATHER
 - PRIVATE PILOT OPERATIONS

Some of the pathways provide learners an opportunity to gain certification(s) and/or associates degrees prior to graduation. In addition to diplomas, certifications, and degrees, the very nature of CTE programs provide students experiential opportunities to learn 21st century skills, including critical thinking, creativity, collaboration, communication, flexibility, technology literacy, media literacy, information literacy, leadership, initiative, productivity, and social skills. These skills are aligned with those most wanted by employers, as reported in the National Association of Colleges and Employers' *Job Outlook 2020 survey*:¹⁴

1. Problem solving skills
2. Ability to work in a team
3. Strong work ethic
4. Analytical/quantitative skills
5. Communication skills (written and verbal)
6. Leadership
7. Initiative
8. Detail-oriented
9. Technical skills
10. Flexibility/adaptability
11. Interpersonal skills (relates well to others)
12. Computer skills
13. Organizational ability
14. Strategic planning skills

These skills also naturally align with the critical components for meaningful learning with technology, including intentionality (goal-directed), active (manipulative, learning-by-doing), constructive (creative, reflective), cooperative (collaborative), and authentic (relevant, contextual, real-world).¹⁵ Some of the Career Clusters and Pathways also have a direct alignment to information technology, including A/V Technology & Communications; Business Management & Administrations; Finance; Information Technology; and Science, Technology, Engineering & Mathematics.

The remainder of this report explores the intersection of digital learning and CTE.

¹⁴ <https://www.naceweb.org/talent-acquisition/candidate-selection/key-attributes-employers-want-to-see-on-students-resumes/>

¹⁵ Jonassen, D., Howland, J., Crismond, D., & Marra, R. (2008). *Meaningful Learning with Technology* (3rd ed). Pearson/Merrill Prentice Hall.

Digital Learning and CTE

Three key findings of this study—as explored in several of the profiles within this study—are:

1. Online CTE courses and programs often provide career education options for students who would not otherwise have access to good opportunities.
2. Full-time online schools provide CTE programs by offering a combination of online career courses and by partnering with businesses, state and regional training centers, and other organizations to combine online learning with on-the-ground, real-world jobs, internships, and learning opportunities.
3. Hybrid schools and programs, including those run by mainstream districts, provide academic scheduling flexibility to students who seek to prioritize their time in jobs, internships, or career training. No longer do these students have to fit in their career interests after regular school hours or on weekends—when many companies and high-value jobs are not open or available. For example, a student interested in a veterinary career can work at a vet’s office during the regular week and school hours, completing some of their online coursework after normal work hours.

The fact that digital learning integrates so well with CTE is reflected in the ways in which digital learning supports several of the 12 elements of the 2018 Quality CTE Program of Study Framework, as detailed below.

Access and Equity

Online courses provide opportunities for students to engage in courses, and with teachers, that they would otherwise not have access to. Online schools offer an educational option for students who have found themselves not well served by traditional public schools, for reasons including mental and physical health, because they have fallen behind academically or wish to move ahead at a faster pace, or because they seek scheduling flexibility.

Current industry content available online to high schools has been limited. Stride is leveraging the acquisition of three adult training companies to create high school level content. Destinations Career Academy of Colorado successfully piloted MedCerts content in the Stride Career Learning program. These high quality courses aligned to current industry standards expand the online courses available to high schools. This access issue is not just about the ability of online schools to offer a wide range of career courses. In addition, because some students do not have access to CTE offerings (due to lack of teachers, facilities, or materials), some CTE programs are turning to digital learning options to ensure all students have the opportunities. As an additional example, Indiana Connections Career Academy (INCC) illustrated their commitment to providing students equitable access to CTE options by partnering with eight career centers located in several rural and urban areas around the state.

Business and Community Partnerships

Business and community partnerships serve as a lifeline for students' career exploration. Some partnerships can occur via online courses, such as for the information technology pathway—because many computer technology and skills courses are typically taught online for all students. In other areas, such as the Health Sciences cluster, however, most partnerships typically need to occur in-person and at a healthcare facility.

One of the schools featured in this report is the Insight PA Cyber Charter School, a comprehensive high school offering a Stride Career Learning program with 15 tracks, including computer programming, health professions, and business pathways, as well as a construction pre-apprenticeship, robotics pre-apprenticeship, pharmacy tech pre-apprenticeship, and certified nursing assistant program. The pre-apprenticeships are all coordinated by businesses that Insight PA partners with. Insight PA works with many corporations and professional organizations across the state, including the Association of Builders and Contractors (ABC), Penn College, CVS Corporation, PITT OHIO, and IBM. Insight PA's curriculum that students engage in during their coursework is all online, while the pre-apprenticeships and other work-based experiences require students to show up physically at training centers located near their residence.

Insight PA partners with the University of Pittsburgh Medical Center, which has hospitals across the state, to offer their health professions pathways. Students in that pathway work at their local hospitals two days a week. Students can also engage in dual enrollment courses through colleges and universities, such as Arizona State, Grand Canyon University, and Pennsylvania's community colleges, to work toward a degree related to their area of interest. Insight PA students also watch live surgeries, such as hip replacements, knee replacements, and kidney transplants. Barry King, Director of Career and Technical Education at Insight PA, added, "There are a couple of places, one in Pennsylvania and another in New Jersey, where the surgeon demonstrates for students a play-by-play of what he's doing, so it's very educational." Another compelling example of virtual learning by way of partnerships is shared by James Malcom, CTE Campus Director at Virtual Arkansas: "The teacher for the criminal law course is an assistant prosecuting attorney, and when she gets permission from the case's judge, she live streams the day in court so that students can see her in action."

Destinations Career Academy of Colorado (CODCA) has more than 15 industry partnerships with their Stride Career Learning program. These industry partners sit on the CTE program's advisory committee. Each industry partner offers internships and other work-based learning opportunities to CODCA's students. The school also partners with a company called CareerWise which helps place students for internships. Additional industry partners engage with the school and its students through Nepris by way of guest speakers, career tours and visits, and career-based learning online. INCC also uses Nepris and hosts at least a dozen opportunities each week for students to connect with professionals online. Additionally, INCC connected their students with over 300 field experts in their physical professional spaces during school year 2020–21.

Nevada Career Academy (NCA) has a unique professional mentorship program where they connect students with industry professionals to talk about goals and to keep up-to-date on what is happening in the field. In addition to their career-based courses, students at Oxford Virtual Academy (OVA), which is a program within Oxford Community Schools district in Michigan, have links to professionals through independent studies that are set up like project-based learning opportunities. Some OVA pathways require work-based learning through training and/or apprenticeships. The district recently purchased access to Nepris to provide students more opportunities for career exploration through business and community partnerships and networking.

Prepared and Effective Program Staff

A variety of staff roles support the intersection of CTE and digital learning. Depending on the program's model and size, program staff can include district and school staff, such as superintendents and CTE curriculum coordinators, or a combination of CTE directors, counselors, principals, program managers, and more. In district-run online and hybrid schools, district-wide CTE teachers may instruct the CTE courses in the online school. This is the approach at OVA, for example.

In many of these programs, non-teaching staff play a critical role. Students have a counselor who helps them navigate their coursework, while their mentors serve as cheerleaders and coaches, providing them structure and support as needed and assisting them with resolving any issues.

The Insight PA team consists of King, who serves as the Director, a coordinator who drives students into the program, four business teachers, two health professions teachers, and two computer science teachers. The Stride Career Learning program at Alabama Destinations Career Academy (ALDCA) has a number of staff that support the program, including an assistant superintendent, CTE district coach, district- and ALDCA-counseling teams, as well as advisors, coordinators, and administrators who are specifically dedicated to the CTE program.

At Destinations Career Academy of Colorado (CODCA), a counselor meets four times a year with each student to discuss academic goals, their courses, and how they are progressing. If students want to change pathways, they can do so at any time. Every student also has an engagement advisor who helps students structure their day to succeed and get the support they need. Across all pathways, CODCA's certification pass rate is between 75% and 80%.

Facilities, Equipment, Technology, and Materials

In digital learning, while it might be difficult to engage with equipment that requires physical facilities, some CTE programs provide virtual reality experiences as well as simulations and other digital manipulatives to enhance student learning. Students in the Stride Career Learning program at Cyber Academy of South Carolina (CASC) meet on Fridays at health care facilities located around the state to meet the face-to-face requirement for Health Science 2. For OVA's information technology coursework, the school sends Adobe Photoshop and Illustrator, as well as Autocad and Autodesk 360 Fusion to their students. If students need a computer and/or Internet access, OVA provides that, depending on the functionalities that students need in their coursework and other learning opportunities. Similar to OVA, CODCA sends software to students who need it, especially for those enrolled in the information technology pathway. Students in the health professions pathway at CODCA receive clay from the school for the anatomy and physiology course so that they can each build a human body. The school also sends lab equipment for their science courses. Some schools also work with business and community partners to secure facilities, equipment, technology, and materials. INCC has eight career centers that they partner with across their state, and they are the only online school that has this type of partnership with the centers in their state. INCC also has a partnership with a makerspace in northern Indianapolis. As Stephanie Chi, INCC's Principal, emphasized, "These centers and field-based work opportunities offer students prolonged hands-on learning experiences with professionals to really apply what they are learning."

Student Career Development

Career exploration in digital learning takes many forms, some of which include virtual job shadows, career professional webinars, virtual industry tours, virtual field trips, and more. Career development can also include workshops for students focused on writing resumes, interviewing for jobs, navigating the housing market, buying cars, and more, as is done at NCA which also has a mock interview program. While place-based CTE programs are often limited to local chapters, digital meeting and engagement options help to expand Career Technical Student Organizations (CTSO) experiences to regional, state, national, and international events. CTSOs provide students additional opportunities to network with industry professionals. CASC's students, for instance, engage in three CTSOs—Health Occupations Students of America (HOSA); Family, Career, and Community Leaders of America; and SkillsUSA. CODCA has CTSOs for each of the five pathways that also offer blended learning opportunities through conferences and state competitions. INCC has an active, award-winning chapter of Future Business Leaders of America, which is shared in their school profile.

Engaging Instruction

Engaging instruction can mean many things, but in CTE, project based learning (PBL)¹⁶ is a crucial part of the experience. It helps students develop essential professional skills and learn how to be effective workers no matter the environment. High-quality PBL, according to Buck Institute for Education,¹⁷ includes six criteria:

- “Intellectual Challenge and Accomplishment: Students learn deeply, think critically, and strive for excellence.”
- “Authenticity: Students work on projects that are meaningful and relevant to their culture, their lives, and their future.”
- “Public Product: Students’ work is publicly displayed, discussed, and critiqued.”
- “Collaboration: Students collaborate with other students in person or online and/or receive guidance from adult mentors and experts.”
- “Project Management: Students use a project management process that enables them to proceed effectively from project initiation to completion.”
- “Reflection: Students reflect on their work and their learning throughout the project.”

These six criteria work into the PBL infused into CTE courses, providing students with opportunities to ignite their creativity, make authentic connections between what they are learning and the world around them, and take ownership of their work. For CTE teachers, PBL provides the structure for them to become guides that facilitate their students’ learning and discovery processes. In addition to PBL, some programs, such as VLACS and INCC, give students opportunities to earn badges as they complete their content and work-based learning. These badges add incentive for students to gain skills as well as recognition as they learn. These programs, among others, also provide many experiences for students to engage directly with experts from the field.

¹⁶ Lauer, A., & Mihok, B. (2017). Moving Beyond 20th Century Education: Emerging Trends in CTE and Project-based Learning. University of Pittsburgh Institute of Politics. http://iop.pitt.edu/sites/default/files/Reports/Status_Reports/IOP%20-%20Moving%20Beyond%2020th%20Century%20Education.pdf

¹⁷ Mergendoller, J. R. (n.d.). Defining High Quality PBL: A Look at the Research. Buck Institute for Education. <https://hqpbi.org/wp-content/uploads/2018/04/Defining-High-Quality-PBL-A-Look-at-the-Research-.pdf>

School and program profiles

The remainder of this report highlights 10 CTE program profiles, each of which illustrates a unique angle on their use of digital learning in CTE. Some digital schools fall into multiple categories below, however, they are listed in the areas in which they are highlighted within this report. Schools that fall into multiple categories include a footnote to clarify the other categories under which the school falls.

- Full-time online schools enrolling students statewide
 - Cyber Academy of South Carolina
 - Nevada Connections Academy
 - Oxford Virtual Academy
 - Insight PA Cyber Charter School
 - Indiana Connections Career Academy
- Full-time online programs operating a hybrid approach within a school district
 - Alabama Destinations Career Academy
 - Destinations Career Academy of Colorado
- Statewide supplemental online programs partnering with school districts
 - Virtual Arkansas
 - Virtual Learning Academy Charter School¹⁸
- District offering a hybrid approach
 - Placentia-Yorba Linda Unified School District

Cyber Academy of South Carolina

Greenville, South Carolina

Stride Career Learning is a program within the Cyber Academy of South Carolina (CASC), a full-time online charter school serving students across the state. In the 2020–21 school year, CASC Stride Career Learning served a total of 1,487 students in grades 6th through 12th.

Two learning coordinators work with students in a career internship class to place students into relevant positions of interest, connecting them with a variety of work-based learning opportunities. A counseling team provides another line of support for the students, working with them on their individualized graduation plans. A career counselor provides guidance for students as they are making decisions on the work-based learning opportunities they are interested in pursuing. The college counselor helps students set up tours of colleges and navigate the financial aid process. In addition to the counselors, students are assigned a success and strategy coach who helps students with resume writing, interview techniques, and job searches.

CASC Stride Career Learning program staff serve as faculty sponsors for three national Career Technical Student Organizations (CTSOs)—Health Occupations Students of America (HOSA); Family, Career, and

¹⁸ Virtual Learning Academy Charter School also falls under the “Full-time online schools enrolling students statewide” category.

Community Leaders of America; and SkillsUSA. As Nicki Batson, the CASC’s High School Principal, shared, “CASC Stride Career Learning program’s staff goal is that 100% of our students are going to graduate with professional certifications or credits toward their degrees. In the 2019–20 school year, 84% of our students graduated college or career ready.”

Nevada Connections Academy

Reno, Nevada

Nevada Connections Academy (NCA) is a full-time online charter school located in Reno, Nevada, serving students in grades 9 through 12 across the state. In the 2020–21 school year, NCA served a total of 1,400 students.

NCA’s Superintendent, Chris McBride, shared, “When students enroll in NCA, they are required to choose one of three pathways: (1) Advanced Placement/Honors, (2) Career Technical Education, or (3) Dual Enrollment.” The CTE program includes NCA’s offerings as well as online courses offered through Truckee Meadows Community College (TMCC) in Reno. NCA offers six specific CTE clusters: business management, marketing, and health sciences in-house, and early childhood education, graphic design, and cyber security through the partnership with TMCC. NCA plans to start offering hospitality and tourism for the 2021–22 school year. As Katie Vaughan, NCA’s Grades 11 and 12 Principal emphasized, “The idea was to create opportunities for our students to experience as many career technical options as we could provide. We focused on those we could facilitate in-house, and then for the CTE pathways that we could not pull off in-house, we looked to our college dual enrollment partner to structure those classes.”

Throughout the courses, students are introduced to a number of professionals in the fields aligned to their pathway. When students finish the courses in their pathway, they can take the state assessment aligned to that pathway, and if they pass, they can graduate with a College & Career Readiness diploma. There are also two pathways that provide opportunities for certifications: Health Sciences and Cybersecurity.

To support students’ program navigation, NCA has a CCR specialist as well as a CCR counselor. The CCR specialist manages and monitors the dual enrollment students, while the CCR counselor manages the students who are doing the pathways at TMCC. Additionally, five NCA teachers instruct the NCA CTE courses. The TMCC courses are taught by the college’s faculty. Personnel at TMCC provide grades and any updates as needed to the CCR counselor.

Oxford Virtual Academy

Oxford, Michigan

The Oxford Virtual Academy (OVA) is part of Oxford Community Schools (OCS), and serves seven counties scattered around the state of Michigan. Students can enroll in OVA full-time or part-time. In the 2020–21 school year, OVA served a total of 526 students (489 full-time and 37 part-time), including 351 high school students (323 full-time and 28 part-time) and 175 (166 full-time and 9 part-time) middle school students.

Currently, as Lisa Butts, Director of Career Technical Education at Oxford, explained, “Michigan does not allow CTE programs to be entirely online, so OVA serves as a career readiness program, offering most curriculum online and providing students connections to professionals in the field by way of partnerships with business and industries across the state.” Matt Santala, Assistant Principal of OVA, added, “We believe that in certain programs the entire curriculum could be taught online. But there are certain classes where that hands-on component would potentially be missing if we moved it entirely online.” Butts and Santala regularly work together to brainstorm ways to integrate and expand offerings and flexibility for students.

OCS is hoping the state will relax its requirements for state-approved CTE programs. Currently, OVA operates only in the career-focused (career readiness) space and does not offer CTE tracks. What OCS hopes is that the OVA courses could serve as introductions to the 17 Career Pathways available to students across the state of Michigan.

Insight PA Cyber Charter School

Exton, Pennsylvania

Insight PA Cyber Charter School (Insight PA) is a full-time public online charter school serving K–12 students across the state. In 2020–21, Insight PA served a total of 1,400 students.

Insight PA students engage in CTE learning through the Stride Career Learning program based on Pennsylvania’s Future Ready Index. As King, Insight PA’s Director of Career Technical Education, emphasized, “My saying is, ‘What kids do in Kindergarten through 8th grade will determine what kids do in 9th through 12th grade.’ Based on that, we prioritize a robust, lively, and experiential K–8 career education program.” For students in grades Kindergarten through 5th, parents or guardians serve as learning coaches for students. Learning coaches work alongside teachers to help record student attendance, monitor mastery of online lessons and assessments, and review student work. Course work provides students a glimpse into careers they can explore. Students spend approximately 15% of their learning time online while the rest is done in project-based learning offline.

Alabama Destinations Career Academy

Mobile, Alabama

Alabama Destinations Career Academy (ALDCA) is a full-time online program that is situated in the Chickasaw City Schools district. In 2020–21, ALDCA served 1,883 students in Kindergarten through 10th grade across the state. ALDCA will add 11th grade in 2021–22 and 12th grade in 2022–23.

ALDCA Stride Career Learning program exposes students to careers for Kindergarten through 9th grade as well as basic pathway courses for 9th grade specifically. These opportunities come in the form of virtual and in-person field trips, guest speakers, and a special news-type programming called Careers Across Alabama, where the CRE administrator travels to different places in Alabama to interview professionals about the work they do. Locations this year included Huntsville Hospital regarding their Core Rehabilitation facility, Mercedes, and Lockheed Martin.

Mr. David Wofford, Chickasaw City Schools Superintendent, emphasized,

The goal of Chickasaw City Schools is for every single student to be prepared for the day after graduation. In order to achieve this goal, our students must be career ready with skills to obtain sustainable wage employment. A high value certificate enables our students to enter the workforce and also prepares them for a process of life-long learning. Employers will invest in promising employees by funding continuing education throughout employment. Education to stay ahead of the speed of change never ends. Our students can continue through two, four year or even advanced degrees, or they may choose advanced certifications. Either way, successful employment is always the end goal.

Each year is dedicated to providing students more opportunities to explore career pathways:

- During sixth grade, first semester is dedicated to exploring all pathways, while second semester, students explore manufacturing specifically and its three branches, including welding, electronics, and industrial maintenance.
- In seventh grade, students do more exploration in the first semester and then go in-depth into health science, including its four branches - nursing assistant, pharmacy technician, billing and coding, and medical assistant.
- Eighth grade focuses on an exploration of the information technology pathway, including the branches of programming, web design, and digital design.
- By the end of their middle school experience, students pick a pathway for high school. At that time, the counseling team meets with caregivers/parents and their students to help facilitate the decision-making process and answer questions.

Destinations Career Academy of Colorado

Westminster, Colorado

Destinations Career Academy of Colorado (CODCA) is a Stride Career Learning Prep program of Julesburg School District (JSD), serving students grades 6–12 across the state. In 2020–21, CODCA served 811 students, which includes full-time as well as part-time district students. Part-time students take their core courses at Julesburg Middle or High School, and then they take their CRE courses with CODCA.

CODCA's Certified Nursing Assistant (CNA) program provides students the opportunity to sit for their certification exam and become a nurse assistant by the time they graduate. A Registered Nurse teaches the CNA courses, and there are two medical lab locations - one on the Julesburg School District campus and one at the Westminster Classroom - where students can fulfill their required lab hours. The students also complete rotations at nursing homes to fulfill their clinical hours. CODCA sets up agreements with the nursing homes where each of the students intern for clinical hours. Students who are interested in the Certified Medical Assistant, Pharmacy Technician, Phlebotomy, and Electrocardiography programs also get certified by the time they graduate. As Teri Cady, CODCA's Head of School, shared:

Our health sciences certifications are valuable for our students because when they graduate, as long as they pass the certification exam, they can say, "I'm a Certified Nursing Assistant" or "I'm a Phlebotomist" or "I'm a Certified Medical Assistant." It gives our graduates an advantage as they enter the workforce.

The school's academic learning is almost all online, and the school offers blended learning opportunities via various work-based learning experiences around the state, and includes partnerships with community colleges and universities for concurrent enrollment opportunities. Every student must select a pathway by the end of their freshmen year or their first year enrolled. Ninth grade serves as an exploratory year for students. All middle and high school students take career readiness education courses each year.

Virtual Arkansas

Little Rock, Arkansas

Virtual Arkansas is a supplemental state virtual school offering CTE courses to individual students as well as schools and districts across the state. In 2019–20, Virtual Arkansas served 6,858 CTE enrollments.

Virtual Arkansas' online courses are taught by full-time teachers, so the teachers are available to students throughout the day. The teachers offer two scheduled synchronous sessions per week. Students can also meet with their teachers as needed. For the courses that have a majority of hands-on components, such as welding and other machining-related offerings, Virtual Arkansas prioritizes those courses as hybrid ones. Some of their teachers travel to districts and Education Service Cooperatives across the state to facilitate hands-on labs as needed, such as sheep heart dissection and CPR certification. Additionally, for the aviation program of study, the local district supplies participating students with FlightSim software and hardware, such as joysticks, for their classrooms. Through an agreement with Henderson State University (HSU), students who take the aviation program of study and complete the seven courses can skip their first seven hours of college credit if they attend HSU.

Virtual Arkansas is also developing 80 blended learning courses with the Arkansas Department of Education's Division of Career and Technical Education (DCTE). Working with the DCTE, Virtual Arkansas provides CTE opportunities for rural schools that do not have the opportunity to provide many courses to their students. Based on the funding and coordination of local business and industry, the school is also creating digital learning content for adult learners and high school students with an emphasis on high demand industry skills. They have multiple partnerships with universities around the state; partnerships in the CTE program currently include the University of Arkansas at Little Rock and the University of Central Arkansas for their Cybersecurity program and Henderson State University for the aviation related courses. In addition to the full service course offerings listed in Figure 4, they also offer over 60 content-only options to cover any courses that have not been developed by the local school's teacher.

As part of their collaboration with the DCTE on the 80 content-only options, 40 are being developed now, and they will develop 40 more in 2021–22. This work with CTE teachers across the state is helping to build their capacity in digital pedagogy and establish strong professional relationships with each other. When they initially started this project, many CTE teachers were unsure of how their courses could be offered digitally, but over time, they have come to work together to brainstorm and problem solve approaches to teaching and learning in their specific content area. Candice McPherson, Director of Design and Development at Virtual Arkansas, added, "Our medical terminology teacher said, 'Now that I've worked on this project, I want to go back and redo my course to come up with better ideas for how to implement this.' That's so cool to watch."

Virtual Learning Academy Charter School

Exeter, New Hampshire

Virtual Learning Academy Charter School (VLACS) is the state virtual school of New Hampshire (NH). VLACS offers part-time and full-time enrollment options for students and partners with school districts across the state to provide CTE learning opportunities. In 2019–20, VLACS served 12,500 students.

Scott Prescott, VLACS’s Instructional Program Manager, shared, “When we started offering career-based learning opportunities, we did this in conjunction with the state-supported ‘extended learning opportunities’ or ELO initiative.” Over time, VLACS has continued to expand students’ opportunities to explore, learn about, and experience careers. VLACS has developed partnerships with hundreds of professionals and many businesses and organizations in NH and surrounding states. Students can meet with professionals to learn about careers and career pathways, complete virtual or in-person job shadows, engage in micro-internships or take one of over 100 career-related course offerings. This allows students to explore a variety of career options through various entry points or to pursue focused learning about a specific career. VLACS micro-internships allow students to work with professionals to complete tasks directly related to a career of interest. These range in time required and credit value depending on the competencies students are mastering and tasks they take on. In one example, a graduate of VLACS, Kai Dennett, worked with a former journalist for the *Boston Globe* and *New York Times* to help develop his writing skills. He also worked as a writer alongside a Broadway playwright as well as a graphic artist designing tour posters for a rapper. Because of all of his connections, Dennett proceeded to produce his first gallery show and is now working as a freelance design artist for marketing companies.

VLACS also offers Career Connections sessions in which a professional discusses their process for becoming who they are. For instance, Chris Zecco works as the Video and Motion Design Manager at a marketing agency in Nashua, NH. Zecco has partnered with VLACS to present during Career Connections. Zecco spoke to students about his company, his industry background, how he got to where he is, and what students can expect going into this field. These sessions help students get acclimated with the opportunities available without having to jump into anything before they know much about a certain path.

As Steve Kossakoski, Executive Director of VLACS, shared,

There are a lot of areas that work well online along with work-based learning in businesses. There are also some programs where a small percentage of the program will work online but the majority will need to be done at a physical location. These work-based learning opportunities allow students to fully jump into career exploration in a way that provides them with direct connections and experiences in the industry. Students can begin with courses first and then participate in work-based experiences or they can start a work-based experience and then enroll in a course. Students also have the option to earn credit through experiences, which allows them to design work-based projects aligned with academic and/or career competencies. Kai Dennett’s example demonstrates that flexibility. Some of his work-based learning opportunities were fully online, and some required him to have in-person meetings.

Placentia-Yorba Linda Unified School District

Placentia, California

The CTE program at Placentia-Yorba Linda Unified School District (PYLUSD) offers a wide range of opportunities for students to explore their interests. In 2020–21, PYLUSD had 3,000 students take part in CTE pathways across the district. The PYLUSD CTE program is known collectively as the CareerLink Academies. To participate in the CareerLink Academies, students in PYLUSD non-traditional schools are encouraged to engage in concurrent enrollment in the Academies through their pathway’s respective PYLUSD high school. Students can choose to apply to a CTE pathway that is not within their school of residence via the school choice application and program. PYLUSD requires students to be enrolled in the traditional high school where the CareerLink Academy is housed. Each high school in PYLUSD specializes in at least two CTE pathways. Esperanza High School houses the medical and engineering pathways. Yorba Linda High School offers the business, culinary arts, and hospitality pathways. Valencia High School offers the digital arts pathway, which includes coding and film making. The CTE pathway of information technology has a strong digital learning component. The teacher for that pathway, Dwight Osbourne, is a computer scientist, and teaches his classes in a hybrid format. As Carrie Bisgard, Director of Instructional Support for PYLUSD, emphasized, “Dwight is familiar with the technology and with online pedagogy and has been forward thinking in terms of changing the model.”

In addition to the courses in the information technology pathway, the business pathway at Yorba Linda High School also has shifted to digital learning because some of the pathway’s courses did not fit within the traditional school day. Because of the COVID-19 pandemic, the medical sciences teacher at Esperanza High School also ventured into online curriculum. The pathways that require a more blended approach have physical spaces set up at their respective high schools where their CareerLink Academy is housed. This physical space is where any physical class meetings or events are held as well as where tools, resources, and materials are available for students to interact with. When students are interested in attending a CareerLink Academy, they first explore the options across the district’s high schools. If the students are interested in attending an academy that is not in their school of residence, they apply to the academy they want to enroll in. As long as there is room at the school and the students meet that school’s academy’s criteria, which differs for each academy, they are admitted.

Indiana Connections Career Academy

Indianapolis, Indiana

Opened in the 2017–18 school year, Indiana Connections Career Academy (INCC) is a full-time online school district serving 6th–12th grade students across Indiana. INCC served 608 students in school year 2020–21. As part of their student support system, their program includes Career Technical Student Organizations (CTSOs). One of the CTSOs they are most proud of is their chapter of Future Business Leaders of America (FBLA). INCC’s chapter of FBLA meets bi-weekly, and they have earned multiple awards as a team and as individuals from the National Chapter, including Super Sweeps for their member recruitment, Non-Stop November for their cause awareness for first responders and financial literacy, and Action Awareness. In addition to their awards, the chapter is concentrating on diversity, equity, and inclusion (DEI) and has invited multiple experts to share their experiences. Whereas some chapters of FBLA might limit membership to

students in fields specific to business, focusing on DEI has opened up their chapter to welcoming students from a variety of career clusters. As INCC Principal Stephanie Chi shared, “Our FBLA chapter is an inclusive community, providing students learning opportunities that enhance their eye for business, increase their employability skills, and prepare them to be marketable as they enter the business community.”

INCC also offers a course called Career Education that centers on badging, which is tied into their curriculum, meeting Industry-specific Standards and Indiana Department of Workforce Development’s Employability Skills Standards (Mindsets, Work Ethic, Learning Strategies, and Social and Emotional Skills).¹⁹ In this course, students are introduced to badging options. The badges allow students to “create their own path,” as Chi explained, “because I think the best student differentiation technique is student choice.” As part of this course, students can also request to meet with a guest speaker of their choosing who aligns with their interests, participate in community service, learn how to prepare a professional resume, get certified in OSHA, CPR, or PYTHON, and more. These badging options require students to reflect on how their learning experiences have helped prepare them for their future and act as a means for assessing students toward certification requirements in their respective career clusters. Each activity a student completes earns the student a badge at a yearly award ceremony. INCC also focuses on one of the Employability Skills Standards each month, which encourages instructors to refocus lessons to put additional emphasis on that standard as it relates to the topics being covered in the curriculum. For instance, the standard in May 2021 was “lifelong learning,” and Chi asked instructors to have students reflect on where they saw themselves in five years and what they might be focused on to enhance their learning at that time.

The Future of Digital Learning in CTE

The pandemic and widespread shift to remote learning over the past year has further pushed the intersection of digital learning and CTE. According to Fitzgerald of Advance CTE, “While there were some rural communities in several states that were engaging in digital learning before COVID hit, providing asynchronous sessions and transportation to technical centers, specifically for those needing to take certification tests, the pandemic really expedited the use of digital learning in CTE.” As Michael Connet, ACTE’s Associate Deputy Executive Director for Outreach and Partnerships, shared:

During the pandemic, community organizations in states such as Delaware, took hyper local approaches to provide hands-on learning. In New Hampshire, for example, educators worked with a flipped classroom model, where there were a couple hours of learning online and the rest in a lab. In Florida, some CTE programs were partnering with virtual reality companies, sending kits to students, and letting them practice through the curriculum.

The pivot in CTE because of COVID has also resulted in an increase in strong public-private and community-based partnerships at the state and local level, including incorporation of local industry advisory boards. As Fitzgerald emphasized, “Shared ownership is key. In Wyoming, educators are going into industry to learn more about all of the career opportunities for students so that they are better able to serve as mentors in their students’ decision-making processes for their pathways.”

¹⁹ <https://www.doe.in.gov/sites/default/files/wf-stem/employability-skills-competencies-final.pdf>

Now, the field is thinking more critically about what innovations will stick beyond COVID. As can be seen from the examples shared throughout this report, CTE programs across the U.S. have incorporated digital learning, and online schools have incorporated CTE. Whether trying to overcome challenges related to teacher shortages, lack of work-based learning opportunities in rural areas, or scheduling conflicts, leveraging digital learning has provided CTE programs with a variety of solutions to common issues. While CTE programs have made giant strides in finding ways to incorporate digital learning, there are a number of opportunities where digital learning may be leveraged even more to solve some pain points.

Recent research from Advance CTE²⁰ found that there was lower satisfaction among Black and Latinx students as compared to their white peers regarding opportunities such as work-based learning and internships - places where students would traditionally build networks with employers and the community. Additional research into the inequities in CTE and root causes and strategies to mitigate them are featured in a recent publication by the National Alliance for Partnerships in Equity (NAPE).²¹ In the NAPE publication, the authors shared an approach to systemic change that takes educators from “unaware” to “aware,” from “aware” to “understand,” and finally from “understand” to “action.” The publication went a step further to provide key questions to encourage shift in the system to include the following:

1. “How do educators’ perceptions of, and beliefs about, students affect student outcomes?”
2. “How do students’ perceptions of themselves affect student outcomes?”
3. “How do institutional structures (e.g., policies, climate) contribute to differential outcomes for students in educational environments?”
4. “How do these dynamics affect student course/program participation, persistence, and performance?”
5. “How can educators, individually and collectively, become change agents and advocates for increased student access, educational equity, and ultimately workforce diversity?”
6. “How do we center the voices, experiences, and critiques of students and families in seeking solutions to complex challenges?”

There has to be more intention in the field around making sure that race access/equity, especially for populations that are traditionally underserved and underrepresented, are at the forefront when designing CTE programs to lower barriers and make sure everyone can benefit. Digital learning has the potential to help in this case.

Another opportunity gap is related to geographical location. Individual CTE programs do not offer all pathways. Thus, to address access and equity, the CTE field is considering the idea of CTE without borders, which would allow students to cross state lines and/or enroll in other schools within the state in order to take the courses they want toward the certification, college degree, and/or career they are interested in. CTE without borders is also important for schools/programs who cannot find in-state teachers with CTE credentials needed to cover all career clusters within their state, so licensing reciprocity from state-to-state would be ideal. Fitzgerald emphasized, “Especially places like D.C., Virginia, and Maryland, we talk about that a lot at the regional level. Why wouldn’t we be able to do that? We all share economies to some degree.” Additionally, the field is placing priority on networking opportunities for students to make sure they have

20 https://cte.careertech.org/sites/default/files/AdvanceCTE_CommResearchReport_042721.pdf

21 Burbank, C., Romanillos, R., & Williams, B. (2021). Equity in CTE & STEM Root Causes and Strategies: A Call to Action. PA: NAPE Education Foundation, Inc. https://napequity.org/wp-content/uploads/RC_Call-To-Action_FNL_2021-04-24.pdf

connections to move from course or learning experiences into potential job prospects in their community or beyond, using digital connection means if needed. Another key element of addressing access and equity is the physical spaces, such as shared technical centers, regional learning labs, or even spaces in businesses, that are used to provide learning opportunities to students. Especially for schools that cannot afford materials and space, these business and community partnerships are crucial for CTE students. These centers can also provide students who are taking their courses completely online and learning from home a space to earn their hands-on learning competencies.

More and more, some of the programs that require in-person, hands-on learning and work-based learning for certification, such as the health sciences pathways, are considering what parts of their learning can be done online to leverage the flexibility of digital learning to better accommodate students and faculty. Similarly, COVID has pushed many businesses to flip their model to innovate. Connet shared an example of this from the automotive pathway:

We see a lot of that in terms of investment of time and technology. I was talking to a car dealership last fall. And in the spring, when everything went topsy turvy [COVID], the dealership went out and bought a bunch of GoPro cameras and put them on their technicians, and they were live streaming as volunteers to their local school system to their auto-tech students. The instructor would essentially direct the technician to show certain parts of the operation that they were doing to reinforce the student's attention. When I talked to the dealership again back in January, they'd advanced to the point where they now have pods of students who are working with individual technicians once or twice a week, and they're directing the technician to go to adjust the calipers or whatever it is that they're doing, as opposed to the technician saying, "I'm now adjusting the caliper."

Connet also shared that the field has seen an increased interest in the use of augmented reality/virtual reality (AR/VR) technologies in CTE classrooms in multiple clusters, ranging from the skilled trades with virtual welding equipment,²² to health care with digital anatomy applications.^{23,24}

AR/VR allows students the opportunity to engage in learning that might not be easily accessible to them, not only with rich CTE curriculum but also with field-based professionals in a field that is of interest to them. As Fitzgerald emphasized,

CTE begins with career exploration, allowing learners to find what they love, refining their interests and then providing the opportunities to gain real-world experience and the skills needed for successful careers. The National Career Clusters, which are being revamped again, are reflective of the entire world of work. CTE delivery should be a rich partnership between employers and educators.

High-quality CTE is about the transition into life-long learning. There is no single approach to the way high-quality CTE programs implement learning opportunities for students. Well-designed digital learning can be a critical component providing flexibility, access, and equity for all students, and particularly those populations of students who are underserved and underrepresented.

²² <https://www.realityworks.com/product/realcareer-guideweld-vr-welding-simulator/>

²³ <https://academic.oup.com/labmed/article/41/8/463/2657565>

²⁴ <https://zspace.com/industrycredentials/hs>