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A VISION OF HIGH-QUALITY

- Planting Seeds for the Skilled Trades
- Social Media Is A Business Essential
- Piloting, Prototyping & Program Implementation: Starting a Cybersecurity Pathway
- Supporting the Gender Expansive Student
- Q&A with the CTE Research Network



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TECHNIQUES OFFERS A VISION OF HIGH-QUALITY CTE

WELCOME BACK TO A NEW SCHOOL YEAR AND A NEW YEAR OF TECHNIQUES: CONNECTING EDUCATION AND CAREERS!

We are kicking off the 2019–2020 editorial calendar year with an issue exploring elements of high-quality CTE programs that will be featured in sessions during ACTE's CareerTech VISION 2019, to be held Dec. 4–7 in Anaheim, California.

A few years ago, ACTE embarked on an initiative to bring clarity to the burgeoning conversation around high-quality CTE and help CTE educators and administrators develop and improve the quality of their CTE programs. Resulting from this initiative was our evidence-based framework defining high-quality CTE across 12 elements:

- Standards-aligned and Integrated Curriculum
- Sequencing and Articulation
- Student Assessment
- Prepared and Effective Program Staff
- Engaging Instruction
- · Access and Equity

- Facilities, Equipment, Technology and Materials
- Business and Community Partnerships
- Student Career Development
- · Career and Technical Student Organizations
- Work-based Learning
- Data and Program Improvement

You can find a wide variety of tools and resources for implementing the Framework on our website (**acteonline.org/high-quality-cte**), including self-assessments, white papers, webinars and a resource library.

For the second year, we will also be tagging VISION sessions by the 12 elements, making it easier for attendees to identify sessions that address issues they want to learn more about in order to improve their programs. This issue of *Techniques* will give you a taste of what to expect at VISION and what the elements look like in action!

As apprenticeship director at Chemeketa Community College in Salem, Oregon, Megan Cogswell's work relates to the Access and Equity and Student Career Development elements. In "Planting Seeds: Recruitment Strategies and Challenges for the Skilled Trades" (on pp. 16–21), Cogswell explores employment trends, barriers to recruiting target populations like women and minorities, and innovative recruitment strategies.

Another article, by Philip Peavy and April Pelfrey at Gwinnett County Public Schools, highlights cybersecurity programs and touches on a number of high-quality CTE elements. "Teaching Cybersecurity Through Virtual Labs and Hands-on Experience" (on pp. 28–33) meets criteria under Facilities, Equipment, Technology and Materials; Engaging Instruction, Student Assessment; and Business and Community Partnerships.

Shannon Sheldon's article on "Supporting the Gender Expansive Student" (on pp. 35–39) addresses the Access and Equity element of the Framework and demonstrates the ways in which traditional language, classroom procedures and social norms work against inclusion — while offering suggestions to help readers develop improvements to lessons and language. And further, Peggy and Steven Bridges are "Class Disruptors" (on pp. 40–43), offering insight and inspiration as they encourage teachers to shake up their classroom management with the art of disruption — related to the Engaging Instruction Framework element.

These articles provide a brief glimpse into the wide range of high-quality CTE programs around the country, and we hope they provide you some insights that will help you improve the quality of your programs too! You can find more about the sessions these authors are offering at VISION — along with additional information about the premier professional development event for career and technical education (CTE) — at **careertechvision.com**.

I wish you the best this year as you strive to create and deliver high-quality experiences for students — and I hope to see in you Anaheim in December to celebrate high-quality CTE!

nnWlow LeAnn Wilson

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SOCIAL MEDIA: Employability skills For the 21st century



By Mark Hewitt

TEACHERS, FACULTY, AND ADMINISTRATORS HAVE A UNIQUE OPPORTUNITY TO PROVIDE CAREER AND

technical education (CTE) students with a differentiator — the professional use of social media to influence employability outcomes.

Today's students are digital natives. To capitalize on this core DNA, students should be encouraged to utilize technology — specifically social media — to influence concrete, professional skills.

66 LinkedIn remains especially popular among college graduates and those in high-income households. Some 50 percent of Americans with a college degree use LinkedIn, compared with just 9 percent of those with a high school diploma or less. **99**

By becoming proficient in social business communications, students will stand out among their peers and be more competitive in today's tech-savvy business environment. Mastery over the science of social media enables today's CTE students to conduct themselves with professionalism, represent good digital citizenship, and maintain an impeccable online identity.

Student Moments of Impact: Securing Internships & Jobs

Key inflection points at which a student may be required to demonstrate effective external communication skills include:

- When looking to secure an internship
- When seeking full-time employment

These experiences facilitate career exploration, encouraging students to assess and evaluate their interests. Social media is an essential tool to influence career outcomes. The notion of listening with your eyes — learning from seeing, reading and reviewing — as it relates to prospective employers' LinkedIn pages, websites, job rating boards like Glassdoor, and other public communication channels gives students a stronger understanding of what employees are saying about their employers, as well as what companies value, stand for, and provide to their customers and employees.

Knowledge is power. Encourage students to get to know their prospective employers by conducting independent research; teach them how and why to review corporate social properties in addition to simply attending professional recruiting days. These skills help today's CTE students to become more informed and knowledgeable when making future decisions.

Relationships matter in today's digitally connected economy. The know-how to engage online to influence offline engagement can be an invaluable differentiator.

Social Business Is a Business Essential

It is essential to tie instruction to state CTE standards and competencies, and to possess the means to deliver it. Aligning teaching units and teaching time with curriculum in the CTE classroom requires rigor.

Below is a framework for how to incorporate social media with 11th and 12th grade CTE students across all 16 CTE pathways to achieve results and influence effective business communications in today's 21st century workplace.

11th grade CTE Courses (all pathways) Implement Three Core Building Blocks

1. **Create LinkedIn profiles.** Students should develop their LinkedIn profiles to authentically reflect their brand, including skills and intended message. A complete profile will include a professional photo, headline, relevant experience and education; incorporating industry keywords will increase discoverability through search. Take advantage of attributes like background image, the summary section, interests, volunteer experience and accomplish-

(Smith & Anderson, 2018)

ments to make your identity personal and unique.

- 2. Grow and deepen professional, academic and personal networks. Students should connect with their academic peers, personal relations and professional contacts to jumpstart their network. Encourage students to make online network growth a common practice when meeting relevant people.
- 3. Become original content creators. Students should share content they create as part of CTE — capstone projects, imagery of in-process and complete CTE work, papers — to develop an audience.

12th Grade CTE Courses (all pathways) **Put Social Business Into Practice**

1. Develop audience, authority, reputation and influence. When a student delivers content in their own voice, a brand and reputation begin to emerge. Once created, content can be published and repurposed. Remember, Generation Z students are digital natives; leverage their smartphones to create video content and more.

Setting objectives for how often to publish, in which channel or group the student will publish, how much time will be spent to promote content, and what your engagement and reach goals are will help to establish a plan for personal discipline and a timeline on which to review your goals and degree of accomplishment. In pursuit of employment or an internship, evaluation of metrics and success should be conducted on a weekly basis. CTE teachers adapt as needed.

2. Make social business part of practice.

Focus on one core use case: securing internships and employment. Social media is simply an additional way to communicate. Ensure students stay true to who they are, listen to their network's feedback, and find their personal voice and style. Convert online communications to offline behavior. Ensure that students are employing social business skills to set up calls, interviews and in-person meetings. Network connections will provide feedback organically (i.e., commenting, sharing and liking). Although trying something new and putting themselves out there can be daunting, students will find that their network will be more welcoming than anticipated.

New habits don't happen overnight. Through a pattern of repetition, the science of social media, and its value as a business tool, will become apparent to the young professionals in our classrooms.

Social Media and Social Business Currency

Today's employment market demands a currency of technical skills that necessitates adherence to continued learning and professional development. Helping students embrace this notion, with skills like social media, will assist to propel them forward as lifelong learners. By acquiring a personal accountability for their learning, students will remain relevant and ready to face the 21st century job market, long beyond their secondary education. CTE is structured to influence the needed result and the right posture for students.

3 Key Insights | Takeaways

Below are three key insights for CTE teachers and administrators:

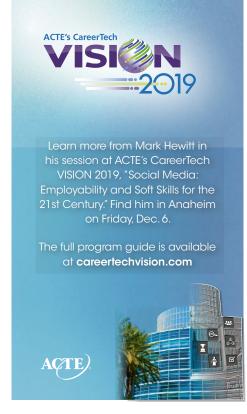
- 1. CTE is aligned to influence a primary student outcome, namely employability. By priming the pump and outfitting today's CTE students, teachers and administrators with the needed 21st century communications competency, this goal becomes increasingly and consistently within reach.
- 2. Encourage students to stand out from the competition and own their personal, professional journey. Embrace communication and collaboration in the classroom and teach the essentials of social media and business communications to differentiate your students in their journey.
- 3. Ensure students have fun with social media and social business commu-

nications. Students are building and enhancing their individual brand and ability to influence and advocate for things in which they believe. Encourage them to take ownership of a key skill set that will pay dividends for the rest of their career.

Mark Hewitt has a passion for social business, organizational transformation and all things digital. Witnessing the impact social media can have on individual brands and their potential for advocacy and influence in digital communications, Hewitt felt compelled to found Socially Savvy. His professional experience includes client care, delivery and management capacities at companies including EQengineered, Cantina, Forrester Research, Collaborative Consulting and Isobar. Hewitt is a graduate of the United States Military Academy and served in the U.S. Army as a cavalry officer. Email him at mark@sociallysavvy.com.

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Smith, A., & Anderson, M. (2018). Social media use in 2018. *Pew Research Center, Internet & Technology*. Retrieved from https:// www.pewinternet.org/2018/03/01/socialmedia-use-in-2018/.





STUDENT ASSESSMENT

By Catherine Imperatore

HIGH-QUALITY CAREER AND TECHNICAL EDUCA-TION (CTE) PROGRAMS OF STUDY USE MULTIPLE

forms of reliable and valid assessment to measure student learning, particularly industry-aligned assessments that give students the opportunity to demonstrate their knowledge and skills in authentic scenarios. For this reason, Student Assessment is one of ACTE's 12 elements of Assessments are aligned to program stan-Program of Study Framework.

The Student Assessment element of ACTE's quality framework includes eight criteria that address the variety and quality of assessments used in the program of study, including the knowledge and skills assessed, types of assessments offered, and the connection between assessments and valuable credentials. The criteria listed below are from the 2018 version of the ACTE Quality CTE Program of Study Framework.

d.

Criteria for High-guality Student Assessment

dards and curriculum and appropriate to students' current level of knowledge and skill attainment.

Assessments are valid, reliable and developed or chosen in accordance with relevant quality standards.

High-quality programs of study follow established best practices in student assessment. Assessments used in the program of study should align to program standards and curriculum, so that they are measuring the knowledge and skills students are actively learning and practicing in the classroom, and which are important to employers. In addition, each assessment should be valid -meaning that it measures what it is meant to measure — as well as reliable; if students take the assessment today and again tomorrow, they should get a very similar score from one day to the next.

Instructors can design and validate their own rubrics and assessments using tools such as the U.S. Department of Education's Reform Support Network Assessment Design Toolkit. Career and technical educators also can choose third-party assessments that have been found valid and reliable through repeated use, through research, or by an educational testing and assessment organization. Frequently, states, school districts and community colleges provide lists of preapproved assessments.

a. Formative and summative assessments are integrated throughout the program of study to validate student learning gains, including both classroom/school-based and standardized, third-party assessments, as appropriate.

The program of study incorporates multiple forms of assessment, including performance-based assessment where students must demonstrate the application of their knowledge and skills.

High-quality programs of study evaluate student learning at regular intervals through formative assessment, of which there are many types: observation, discussion, quizzes, games and peer assessment, among a multitude of others. With practice, instructors can learn to adjust their instruction based on formative assessment results.

Summative assessments measure knowledge and skills after instruction is complete, including performance-based assessments that enable students to apply what they have learned. These demonstrations can come in the form of presentations, portfolios and/or projects. Performance-based CTE assessment frequently takes the form of a challenge with specific parameters. Individuals or groups develop a product or process in response to this challenge and present their work to a panel of judges. This model is particularly common for career and technical student organization competitive events.

Third-party summative assessments can be relevant for CTE programs, notably those that are developed by employers and industry associations as well as by organizations like NOCTI.

If educators or administrators choose third-party assessments, they should work with those providers to determine the modifications that are allowed for exams (particularly for exams leading to industry certification), and how these modifications fit with student needs and individualized education programs (IEPs) required under the Individuals with Disabilities Education Act, if applicable. To facilitate program improvement, CTE program staff should also have access to student performance data on these assessments, either through data-sharing agreements or because the institution, district or state pays the certification exam fee.

Assessments within the program of study provide objective information on student attainment of industry-validated technical knowledge and skills.

Assessments within the program of study provide objective information on student attainment of academic knowledge and skills.

g. Assessments within the program of study provide objective information on student attainment of employability knowledge and skills.

Summative assessments measure knowllge and skills after instruction is complete, cluding performance-based assessments at enable students to apply what they

> High-quality programs of study assess student learning of technical, academic and employability knowledge and skills. Teacher-developed and third-party assessments may measure learning across one, two or all three of these domains, as appropriate. In addition, high-quality programs of study culminate in one or more recognized postsecondary credentials, including postsecondary certificates and degrees as well as licenses and industry certifications, which are earned primarily or solely through written and/or performance-based examinations.

> Standards, curriculum and assessments should align closely to ensure students are learning relevant technical, academic and employability knowledge and skills that will enable them to earn credentials and succeed in careers. This is particularly important for programs that prepare students for occupations in which licenses are required for employment. High-quality CTE programs can formally or informally incorporate licensure and certification exams into curriculum to maximize this alignment.

Success Strategy: Multi-rater Feedback Model

Several years ago, the College of Western Idaho's surgical technology program incorporated the multi-rater feedback model to better evaluate student learning and build competency in the operating room. This more dynamic and interactive approach includes detailed, graded faculty evaluations; weekly, ungraded peer feedback and self-evaluation; pairings of stronger and weaker students for mentoring; and the use of video recordings during clinical experience and mock surgeries. This collaborative model mimics the peer support that is vital in the operating room and, according to former clinical coordinator Angie Wachter and Idaho State

University professor Robert W. Lion (2016), enables faculty to identify problems earlier and provide more targeted assistance to students. In addition, students develop the ability to more accurately self-evaluate, and higher-performing students grow their skills as mentors.

Learn More and Assess Your Programs

Practitioners can turn to ACTE's High-quality CTE Tools online library for publications and other resources about ways to measure student learning. Resources within the Student Assessment section provide questions to consider when implementing performance assessment systems, strategies for selecting and incorporating industry certification exams and career readiness assessments, and tips for using prior learning assessment.

In addition, practitioners can use the *Quality CTE Program of Study Framework Self-evaluation Instrument* to assess a single program or multiple programs across a district or institution, in relation to the Student Assessment element and all 12 elements of high-quality CTE. The rubric can be completed on paper or online, where users can receive automatically calculated scores, save and print their results, and be connected to the online library for areas identified as needing improvement.

Catherine Imperatore is research manager for ACTE. Email her at cimperatore@acteonline.org.

REFERENCE

Wachter, A., & Lion, R.W. (2016). Multi-rater feedback: Improving students' readiness for the OR. *Techniques*, *91*(3), 44–49.

EXPLORE MORE

High-quality CTE Tools Online Library: www.acteonline.org/ high-quality-CTE

Quality CTE Program of Study Framework and Self-evaluation Instrument: www.acteonline.org/high-quality-CTE

e.

f.

CTE Career & Technical Education RESEARCH NETWORK







Katherine Hughes

Shaun Dougherty

James Bartlett

A Q&A WITH THE CAREER AND TECHNICAL EDUCATION RESEARCH NETWORK

Preface

Nearly 12 million secondary and postsecondary students in the United States were enrolled in career and technical education (CTE) in 2016-17, according to data collected by the U.S. Department of Education's Office of Career, Technical and Adult Education (2019). This CTE programming represents a huge federal investment of more than \$1.2 billion, on top of substantial state investments ("State allocations," n.d.). As interest and investments in CTE rise, however, the research is failing to keep pace.

The Career and Technical Education Research Network, a new five-year initiative from the Institute of Education Sciences (IES) at the U.S. Department of Education, seeks to remedy that problem by expanding the evidence base on the impact of CTE programs on student outcomes. In this Q&A, the network's directors, Katherine Hughes, Ph.D., a principal researcher with the American Institutes for Research, and Shaun Dougherty, Ed.D., associate professor at the Peabody College of Education & Human Development

at Vanderbilt University, discussed the goals of the network and how they hope it will contribute to the field. James Bartlett, Ph.D., senior research associate with the Belk Center for Community College Leadership and Research and associate professor of community college leadership at North Carolina State University, guided the conversation.

James Bartlett: Kathy and Shaun, before we get into the CTE Research Network, tell me how each of you became interested in CTE research.

Katherine Hughes: After graduate school, I began working at a research institute at Columbia University that had funding to study work-based learning. There was great enthusiasm at the time about employers partnering with schools to make education more relevant, and about all the kinds of learning that could be done outside of the classroom. I observed a number of high school and community college students at their internships and came away from that project with a new realization of how work-based learning

could transform young people's sense of their own capabilities. That was both moving and exciting.

Shaun Dougherty: I started as a math teacher for students who attended our local technical center for part of their school day. Then, in my role as an assistant principal, I served as a liaison to the technical center and became more familiar with the program design. I found it remarkable how engaged the students were, particularly those for whom the comprehensive high school experience seemed to be disengaging. I also liaised with the special education department and found it impressive how large a share of our students with disabilities participated in CTE — many as part of their formal transition plan. After I became a professor and began working on research in a university setting, these experiences contributed to my curiosity about the potential of CTE for addressing issues of equity of outcomes, both educational and economic.

Bartlett: Can you describe the goals of this new national research network?

Hughes: The network's primary goal is to increase the amount of rigorous research on the effectiveness of CTE programs. In addition, we hope to enlist and train more researchers in this work, in hopes they will devote their careers to the CTE field.

Bartlett: Who are the other partners in the CTE Research Network?

Hughes: In addition to the American Institutes for Research and Vanderbilt University, the Association for Career and Technical Education (ACTE) and JFF (formerly Jobs for the Future) are partners in the network. ACTE has a strong role in this work; its extensive connections with practitioners across the nation are highly valuable in terms of communicating CTE research to the broad field. JFF brings a deep knowledge of the education and workforce systems, and a commitment to improving economic opportunity for all. And we have four participating research teams undertaking large-scale CTE studies.

CTE Research Network Studies

Assessing the Implementation, Impact & Variation of CTE Innovation: NYC as a Lab for Rigorous CTE Research

James Kemple, New York University

The Causal Impact of Attending a Career-Technical High School on Student Achievement, High School Graduation, and College Enrollment

Shaun Dougherty, Vanderbilt University

The Evaluation of Career and College Promise

Julie Edmunds, SERVE Center at University of North Carolina Greensboro

P-TECH 9-14 Schools: An Impact, Implementation and Cost Study Crystal Byndloss, MDRC

Bartlett: Is the CTE Research Network focused on trying to evaluate a particular type of CTE program?

Hughes: We're focused on rigorous research to measure the effectiveness of the range of CTE programs in secondary and postsecondary settings. We're not limited to any particular type of career area, structure or delivery mode. But, since the network's priority is research that can show a causal link between a CTE program and its effects on students, there are certain program elements we look for that make this effort more feasible. For example, programs that receive more applicants than they have spaces available can be good candidates for an evaluation because admission based on lottery or random assignment can approximate a randomized controlled trial.

Bartlett: Why is this type of research so important to the CTE field and a priority with the network?

Dougherty: For years, CTE research has mainly consisted of descriptive studies, many of which were somewhat small in scale and could not determine whether CTE participation, or particular elements of the experience, actually caused differences in later student outcomes. By emphasizing a high level of rigor and highlighting opportunities to do this work in CTE, we hope to spur more research that can capitalize on the power of research designs that support causal inference.

In most CTE research, we have to compare students who might have similar characteristics - race, gender, free-lunch eligibility, town of residence, GPA and so on — but who differ in CTE participation. In these cases, we worry a lot about the factors that we can't observe, those that might cause students to make different decisions about participating in CTE. The potential existence of these factors means that any difference in outcomes cannot be considered cause-and-effect, because there is a chance that these other aspects may have influenced the outcomes. Research designs that instead use random assignment, or an approximation of random assignment, equally distribute the unobservable characteristics between groups, which reduces or eliminates bias.

Bartlett: Why a research network? Why not a research center? Or project?

Dougherty: IES uses the research network model to move a field forward by bringing together teams to improve coordination among their projects, address common challenges to the work, share findings, and build new knowledge together. The CTE network research teams are distinctive in that they are all conducting causal studies of CTE programs — studies that will tell us if participation in CTE causes students to have different outcomes than if they had not participated. A research center relies on a relatively small, static pool of staff and researchers, and on the success of that particular center in identifying and leveraging opportunities for funding and high-quality research. The network allows us to convene and work alongside researchers with varied skill sets, studies and research designs, and with access to different programs and data. This arrangement can more quickly and comprehensively enhance our understanding of how CTE — and different programs, models, and contexts — impacts students' educational, social and economic outcomes.

Bartlett: It sounds like there is a focus on high-quality research to provide evidence on how CTE impacts student outcomes. Are there plans to disseminate these findings beyond other researchers? If so, how will the network share this work with practitioners?

Hughes: Absolutely! We don't just wish to expand the available evidence on CTE programs. It is also our mission to increase the understanding and use of CTE research by policymakers and practitioners. We want the research findings to contribute to policy and program decisions that will improve students' education and career outcomes — that will improve their prospects for their lives.

We'll be posting blogs, making presentations at meetings and conferences, developing fact sheets, and creating interesting infographics to share research findings in ways that anyone can understand and use. We hope to spur a dialogue between practitioners and researchers to better understand the need of folks in the field for data and research to inform their decisions about program implementation.

Given some of the challenges of conducting research in education, it can be hard to provide the answers that practitioners are looking for, though. For example, it takes time to follow students from high school through postsecondary programs and into the labor market



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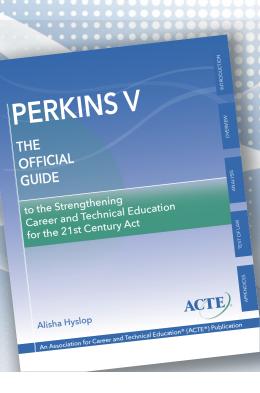
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to answer a question and determine whether completion of a certain CTE program of study will yield a living salary.

Bartlett: You mentioned recruiting and training more CTE researchers, and I agree that this is critical for the field. For example, the CTE Postsecondary Research Program at North **Carolina State University, sponsored** by the ECMC Foundation, is charged with developing the next generation of postsecondary CTE researchers. The program currently provides intensive professional development to a group of 16 postdoctoral and graduate student researchers, supporting their participation in two training institutes, webinars on research methods, and a mentoring program.

How will the CTE Research Network help to develop the pipeline of new CTE researchers? What professional development activities will be offered?

Dougherty: As part of the CTE Research Network, we wish to expand the pool of researchers doing high-quality research related to CTE. For example, I will support postdoctoral students to orient recent Ph.D.s interested in education research and causal inference, helping them to hone their skills and understand the relevant dimensions of CTE in policy and practice so they can expand their research focus to include CTE. I will also be training doctoral students at Vanderbilt in a similar manner, including them in my own ongoing work.

Beyond my personal direct training role, the CTE Research Network is also developing a multi-day training that will take place at least once per year for several years. This event will present researchers with a crash course in how to apply research methods that support causal inference (randomized experiments and regression discontinuity designs specifically) to CTE-specific datasets and policy contexts. Portions of the content will be used to develop online training modules for non-researchers who are interested in, and would benefit from, a better understanding of measures, data sources and causal methods. Bartlett: The CTE Research Network has asked for submissions of programs that would be open to evaluation. Can you share why this is important to the field?

Hughes: This was an open call to find practitioners who are both interested in learning about the effectiveness of their program's efforts and whose program structure and context can support high-quality research. We hope that identifying such programs publicly will help increase the number of high-quality CTE studies.

Bartlett: One of the biggest challenges as a researcher can be to get individuals excited about participating in research. Why should the field see an urgency in participating, and how can practitioners help us understand CTE better to improve student success?

Hughes: Practitioners have an opportunity to inform the content of research questions by engaging in this process. Researchers need to hear the questions that practitioners want answers to. A CTE state director recently shared these questions with me: Should students have more or less workbased learning? Which form of work-based learning has the best return, in terms of the balance between resources needed and value of the experience? What is the best mix of hands-on and classroom learning? The more that this type of dialogue takes place between researchers and practitioners, the more we can collaborate on studies that are the most useful to the field and that have the greatest impact on policy as well.

Dougherty: I would add that researchers are also highly dependent on datasets and research sites to conduct their work. By more explicitly inviting practitioners and policymakers to inform the structure of research, we are optimistic that researchers' needs for data and research sites will be merged with, and serve the need for, evidence of program quality and impact among the practice community.

Engaged scholarship is also becoming increasingly valued in the academic com-

munity, particularly among researchers in professional schools, such as education, social work and public policy. This increased value and emphasis on applied work that can impact practice should create conditions where researchers are more interested and have incentives to partner with practitioners. By establishing some specific examples, we hope that we will build confidence in the value of these partnerships and create a pool of teams who have a reputation for being open to doing this work and being able to do it well.

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EXPLORE MORE

Learn more about the CTE Research Network at https://cteresearchnetwork.org.



Planting Seeds: Recruiting Strategies and Barriers for the Skilled Trades

By Megan Cogswell



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icture a typical college and career fair in a high school gymnasium: rectangular tables lined up with a variety of displays, sprinklings

of candy, and logoed swag such as mechanical pencils and stress balls. Ideally, table staff might be energetic recent graduates, or employers eager to share about their opportunity. Often, they are experienced professionals like me, hoping to plant a seed about the value of working in the skilled trades and learning-while-earning through registered apprenticeship.

I attend events to recruit applicants for Chemeketa Community College's Apprenticeship programs, and, with my coworkers, students for two-year applied technologies programs. In Oregon, high schools are restarting career and technical education (CTE) programs, often in partnership with industry partners facing worker shortages. Federal Perkins dollars help schools with pathways to college and careers to purchase equipment and foster best practices through professional development. Students are in high demand, for there are not enough skilled trade workers to fill the openings; a reported 70 percent of contractors struggle to find qualified craft workers nationally, 75 percent in the western United States (The Associated General Contractors of America, 2017).

We need comprehensive strategies to meet this growing demand, including recruiting and retaining traditionally underrepresented populations.

"Want a pencil?"

In the fall of 2018, I staffed a table at the local school district's career and technical education center. Three women from the cosmetology program came up to my table to try out the buzz game — an obnoxious yet appealing wire game that produces a crashing sound when players touch the wire with the circular wand and started chatting about apprenticeship. After I described the benefits, one of the students asked, "Are these jobs for girls?"

I answered that yes, these jobs are for anyone interested in working hard to learn a trade, and explained that many programs were majority male. I also knew, but didn't say, that Oregon's Bureau of Labor and Industries Apprenticeship and Training Division (ATD) requires apprenticeship committees to take positive, affirmative steps to encourage and promote equal opportunity and to address any barriers to equal opportunity in apprenticeship — including increasing the number of females and traditionally underrepresented populations in registered apprenticeship. I knew that 6.9 percent of registered apprentices in Oregon are female and 19 percent of all Oregon apprentices identify as minority (Oregon Bureau of Labor & Industry Apprenticeship & Training Division, 2019a). The rest are white males.



The students and I talked about the requirements to apply for most registered apprenticeship programs — a high school diploma or GED, age 18 or older, and algebra. Finally, I mentioned that, while they might not be interested right now, they should keep apprenticeship in mind and share the information with their friends planning to enter the workforce after graduation. "You are now apprenticeship ambassadors — want a pencil?" This line, along with a reminder that jobs require math skills, a driver's license and, often, drug screenings, are my recruitment mantra.

Meeting Employer Needs

Employers seek employees with employability skills: the ability to arrive on time, listen to instructions, follow through on tasks, troubleshoot, and work both independently and with a team.

"We can train someone willing and able to learn how to do the job," explained Wayne Wineland at Salem Heating & Sheet Metal in Salem, Oregon, "but we can't do much with them if they don't come to work or listen when they get here."

Career and technical education stakeholders — high school teachers and counselors, community college faculty and administrators, apprenticeship committee members, training providers, employers, community-based organizations, state and federal agencies — play important roles in growing the workforce. Expanding opportunities for underrepresented populations is a critical component of meeting workforce demands. Community colleges are in a strategic position to foster change by exploring barriers, researching and implementing strategies, developing partnerships, and using data to evaluate impact. Success is a win-win-win for employees, employers and the colleges.

A 2018 report from the Portland Metro Workforce Development Board (Metro) provided an excellent answer to the question of why it is important to recruit women and traditionally underrepresented populations for jobs. "Diversifying the construction workforce will not only help create a stronger supply of needed workers for the industry, it will also directly address issues of poverty and economic mobility within communities of color and working families in the region."

The authors identified multiple barriers to diversifying the industry, including:

- Lack of exposure to jobs
- · Fewer connections for personal referrals
- Limited capacity of pre-apprenticeship programs
- A history of racism and sexism within the trades
- · Lower-quality training on job sites
- Fewer opportunities for advancement
- Financial hardships and family obligations taking time/resources away from career focus
- Lack of steady work (especially for newer hires)

Report authors suggested a list of solutions to overcome these barriers; as a community college director and apprenticeship committee administrator, my area of focus centers on increasing funding and support for pre-apprenticeship programs, establishing stronger collaboration and alignment across regional and state systems, and increasing the recruitment and retention of diverse workers while developing robust equity policies and practices (Metro, 2018). Together with the Mid-Willamette Education Consortium (managers of Perkins funding and CTE networking/training for high school teachers), also at Chemeketa Community College in Salem, and my peers in the Applied Technologies Department on campus, we have found ways to educate and engage high school students and recent graduates. Working together, starting in fall of 2017, we implemented multiple strategies to recruit participants into our programs in order to grow the construction and manufacturing workforce, while keeping a focus on equity.

Equitable Recruitment Strategies

Chemeketa Community College participated in the National Alliance for Professional Equity's (NAPE) Program Improvement Process for Equity (PIPE) process, which helps teams use data to both prioritize and act to reduce the equity gap. Our team investigated low female participation rates in applied technologies and apprenticeship programs. We surveyed female students and asked about their experience in the programs. We assessed how much our advisors on campus knew about our programs and if they brought them up to students during advising sessions. The information helped us create "cheat sheets" about the programs and contact sheets for advisors to use as a resource when talking to students. We also met with the advising staff to build relationships and hosted meetings in our spaces. This led to significantly more referrals; advisors started walking students over or calling while meeting with students. We also adapted applications for limited enrollment programs to be more gender inclusive, based on the feedback

from students. We hired a student to help with marketing.

Apprenticeship and Applied Technologies wanted a space to advertise our programs in a visually appealing manner and engage visitors. We decided to create a Trades Information Center (TIC) that could also serve as a classroom in the apprenticeship building on our Salem campus by dividing the office with a wall, adding cabinetry along two walls, and putting in movable tables and chairs. We wanted it to be visually appealing and interactive - like a room in a science museum. There are televisions on which to watch videos and stream content, an iPad with welding and plumbing games installed, large trades-related posters on the walls, and activities spread throughout the space. Visitors are encouraged to try on hard hats and welding equipment, and experience Snap Circuit and building kits, puzzles that test eyehand coordination, and games like Jenga. Dolls with construction clothes, sticker sheets and plastic hard hats for dress-up are popular with younger visitors.

In 2017–18, the TIC hosted more than 1.500 visitors: students from around the

area hear presentations about skilled trade jobs and programs before being given the chance to explore. I also use the space for drop-in advising; the large posters help potential students understand quickly what we offer. We host meetings for Chemeketa staff in the TIC, including open house events and monthly game time as part of our wellness initiative. Regular use of the space promotes awareness about our programs in the larger college community. The TIC is also a committee meeting space and a classroom for apprenticeship courses.

Opening Doors to Apprenticeship

Teachers and counselors visiting the TIC mentioned that students were interested in registered apprenticeship, but often had to wait a long time to get into programs, if they ever did. Research shows the average age of apprentices in Oregon is 28.5 (J. Ponaman, personal communication, June 14, 2019). Many traditional registered apprenticeship selection procedures favor older applicants. In Oregon, registered apprenticeship is the only path to licensure in many trades and yet many young

people, eager to learn a new trade, may not be competitive, even though they are the exact demographic employers are eager to recruit.

Apprenticeship committees tasked with recruiting younger workers began evaluating how to open the door for recent high school graduates. Committees leverage interviews, skill and aptitude tests, and limited application points for years of work experience. Others allow direct entry, extra points, or other preference for applicants who have completed a pre-apprenticeship program. That data led our team to investigate the benefits of designing a pre-apprenticeship program at Chemeketa Community College.

Program Development

Pre-apprenticeship program designs and methods vary, though all prepare people for registered apprenticeship (Oregon Bureau of Labor & Industry Apprenticeship & Training Division, 2019b). Apprenticeship committees sponsor pre-apprenticeship programs to ensure they meet industry needs. Here, the Oregon State Apprenticeship and Training Council (OSATC) approves programs, and registers and tracks participants. Some committees develop and run their own program; others collaborate with nonprofit organizations. Oregon Tradeswomen Inc. and Constructing Hope are examples.

At Chemeketa, we developed a pre-apprenticeship program for high school students in our service area. Both of the committees I administer - sheet metal and HVAC/R - sponsored the pre-apprenticeship program and were instrumental in setting the criteria, after



Chemeketa Applied Technologies Buildings

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having completed a recent overhaul of their application selection criteria. Employers wanted students to have high school classes related to understanding skilled trades careers; construction-related courses like welding, woods and fabrication; safety training like first aid and OSHA 10; a driver's license; math to meet entry requirements; exposure to programming outside of the high school; and employability skills training like interview prep and resume writing.

The Chemeketa Community College Pre-apprenticeship Program, for high school students, was built on Trade Skills Fundamentals, a course from College Credit Now that incorporates trade knowledge, measurement, and an introduction to hand and power tools, safety, and rigging. Once certified, high school CTE teachers are able to offer the class for college credit.

We started the pre-apprenticeship program at one high school as a pilot and it soon spread to 10 other schools in the

ACTE's CareerTech

area. Each school has at least one teacher on faculty certified to teach Trade Skills Fundamentals and a program lead (often a college and career staff member) to collect applications and support student completion. At the end of the two-year program, students earn a certificate, a cord to wear at graduation, and apprenticeship swag, and they are eligible for exclusive committee benefits. Completion provides an advantage for students applying to apprenticeship programs right out of high school and in the future.

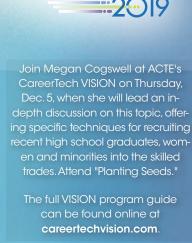
Completing pre-apprenticeship and earning a cord to wear at graduation and getting a certificate at the senior assembly is a point of pride. Lisa Iverson, program coordinator at Cascade High School in Turner, Oregon, emailed, "Both parents and students are so excited that Cascade partnered with Chemeketa and is offering this program. Already, we had a student gain employment at a local shop; when they found out he could weld and had his OSHA 10 training, he immediately received a promotion. Cascade is committed to getting kids the skills they need to be college and career ready!"

Building Relationships

Investing in partnerships and making time for statewide networking can help develop further understanding of registered apprenticeship. When developing and running a pre-apprenticeship program, it is vital to understand state statutes, licensing requirements, and administrative rules that govern registered apprenticeship.

This knowledge aided our team at Chemeketa Community College in our efforts to combat issues with ratio requirements for HVAC/R and sheet metal apprentices. After digging into the statewide minimum guideline standards, we worked to convene the statewide governing committees. This led to robust discussions around education requirements and ratio.





In the end, both committees agreed to change the ratios. Taking the time to learn about the rules — and pushing for change within the system — helped get more people into registered apprenticeship.

We continue to work hard to market registered apprenticeship and skilled trade careers throughout our region by tabling at events; hosting individuals and groups on campus; and continuing to grow our outreach network to include organizations working with diverse populations, including veteran organizations, Job Corps, WorkSource centers, prison reentry programs, education advocacy organizations, alternative education programs, and industry associations. We hand out pencils, hats and t-shirts. We give out posters and recruitment materials to high school teachers and attend statewide events to network. We are looking at digital badging and non-credit courses, adding a support class to run concurrent with Trade Skills Fundamentals, and are part of an exciting internship pilot.

All of these efforts are paying off. We are seeing more applications from target populations and younger applicants for registered apprenticeship. Students we meet already know about registered apprenticeship and mention our materials. This hit home when a young man came to pick up my son's friend last summer. I answered the door; he looked at me perplexed and asked, "Aren't you the apprenticeship lady?"

Megan Cogswell is the director of apprenticeship at Chemeketa Community College in Salem, Oregon. She supports four registered apprenticeship programs. A lifelong Oregonian, Cogswell lives in Salem with her family. Email her at megan.cogswell@chemeketa.edu.

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For the second time at VISION, educational program sessions are tagged, aligned to elements of the ACTE Quality CTE Program of Study Framework. To answer one important question — "What is high-quality CTE?" — this evidence-based framework was created, defining high-quality CTE across 12 elements:

ACTE Inspires

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- Prepared and Effective Program Staff
- Engaging Instruction
- Access and Equity
- Facilities, Equipment, Technology and Materials
- Business and Community Partnerships
- Student Career Development
- Career and Technical Student Organizations
- · Work-based Learning
- Data and Program Improvement

With this knowledge and a suite of valuable high-quality CTE tools, educators are encouraged to experience VISION in a new sense. Learn a few new lesson plan ideas inspired by our Engaging Instruction element (Bridges, p. 40); take a step outside your comfort zone, to understand and support your gender expansive students (Sheldon, p. 34) in the name of Access and Equity.



And, oh, how we have saved the best for last. Closing general session speaker Marcia L. Tate, Ed.D., has worked for over 30 years in the DeKalb County School System in Decatur, Georgia, where she has been a classroom teacher, reading specialist, language arts coordina-

tor, and staff development executive director. She wrote the book on it! A best-selling author and acclaimed educational consultant, Tate will inspire attendees as they return to their homes and schools, resolving to give the very best of themselves to the betterment of CTE.



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> Check out the full VISION program guide online at careertechvision.com!



Cindy Moss, Ph.D., was the director of preK–12 STEM for 145,000 students in Charlotte-Mecklenburg, North Carolina, for 10 years. In that district, she implemented STEM and decreased the achievement gap while increasing staff retention; additionally, her efforts improved graduation rates. Moss has presented at numerous conferences on STEM including US News STEM Solutions, National Title One, National Science Teachers Association, ASCD National conference, Global Women in STEM conference in Dubai, British Schools of Brazil STEM conference, etc.

Following the opening general session, STEM is CTE Symposium attendees will enjoy lunch, information-rich breakout sessions and a closing networking reception. Join education and business om across the nation to address diversity issues related to STEM career paths through CTE, and why it's im-

leaders from across the nation to address diversity issues related to STEM career paths through CTE, and why it's important for all students.



STEM IS CTE

Science, technology, engineering and math: It's CTE! This popular event is back again to address recurrent issues of diversity, equity and access in our programs. CTE classrooms offer hands-on learning environments that bring STEM to life, apply core academics to real-world situations and provide creative problem-solving skills to address our nation's most pressing issues. Together, STEM and CTE expand opportunities for youth to engage in some of the most exciting realms of discovery and technological innovation.

But this matters little when we still see a distinct lack of representation among girls, women and minority students in such high-demand STEM fields. We must do more. And that is our goal, to do more, to recruit these students who express interest in and demonstrate talent for science and technology — and it is our responsibility to reach those who, for societal or other reasons, feel engineering or mathematics careers are out of reach.

The 2019 STEM is CTE Symposium will happen during VISION's pre-conference day on Wednesday, Dec. 4, with an opening general session led by Cindy Moss, vice president of global STEM education initiatives at Discovery Education.

Perkins V Implementation & High-quality CTE Sessions at VISION

ACTE's public policy experts will offer focused sessions at VISION to aid in implementation of the Strengthening Career and Technical Education for the 21st Century Act (Perkins V), which officially went into effect July 1, 2019. Perkins V now governs the federal investment in CTE, and ACTE's public policy staff is pleased to provide an overview of the law with updates on the implementation process and information on how new requirements impact local leaders, particularly the comprehensive local needs assessment and local application.

To bring clarity to the conversation around high-quality CTE and help CTE professionals develop and improve the quality of their CTE programs of study, ACTE will also offer in-depth sessions on its ACTE *Quality CTE Program of Study Framework*. This evidence-based framework defines high-quality CTE across 12 elements and can be used as a tool for comprehensive local needs assessment.





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CareerTech Expo

Meet me at the meeting place. The CareerTech Expo at ACTE's CareerTech VISION is the place to be, where CTE professionals gather for a little fun (The ACTE booth has cornhole!) and a lot of learning. CareerTech Expo features more than 200 companies offering the largest and latest collection of CTE products and services, exhibitor workshops, live demonstrations and a wealth of networking opportunities.

Exhibitor Workshops

In addition to the many products and services displayed, the CareerTech Expo includes four exhibitor workshop classrooms offering exciting educational opportunities. Exhibitor workshops will be offered on the hour during Expo hours, starting at 11:00 a.m. on Thursday, Dec. 5. Attendees are invited to see firsthand what cutting-edge ideas and products are available and how they can be used in the classroom.

As of this printing, ACTE is excited to offer exhibitor workshops led by Solidworks, Chief Architect Software, C-Tech Associates Inc., Certiport, CEV, TestOut Corporation, Career Solutions Publishing, Facebook, Express Employment Professionals, Pitsco Education, 911Trainer. com, CareerSafe Online, ASVAB Career Exploration Program, WhiteBox Learning, CompTIA, OMAX Corporation, Switch Vehicles Inc. and more.

Networking

There's something for everyone at ACTE's CareerTech VISION 2019. Administrators, classroom teachers and students, alike, benefit from networking opportunities such as the popular Career Pavilion. Open to employers and industry partners by invitation only, event attendees may mingle to discuss program alignment with industry needs, while others may discover untapped career potential.

Career Pavilion presenters, representing many of the CTE career pathways, will be on hand to provide specific career information. This may include broad information about their business or industry sector, or detailed information like starting salaries for specific occupations, curriculum that might be used in a CTE program or specific skills gaps within their industry.

Other unique opportunities to meet and get to know fellow stakeholders in CTE include the First-time Attendees Orientation, the Young Professionals Happy Hour Event (Remember, you're only as young as you feel.) — and if a little glam if what you're after:

An Elegant Affair: ACTE Excellence Awards Gala

Come dressed to impress — and to celebrate! The ACTE Excellence Awards Gala, to be held Wednesday evening, Dec. 4, will recognize those individuals who have made extraordinary contributions to CTE, programs that exemplify the highest standards, and organizations that have conducted activities to promote and expand CTE programs. Award winners serve as inspirational leaders to ACTE: They embody core values to serve their students with an unwavering commitment to CTE. The ACTE Excellence Awards Gala promises to be an exciting evening of celebration and camaraderie.

To kick off this elegant affair, who better than an award winner herself: ACTE's 2019 Teacher of the Year Liz Dinkins. ACTE was honored to award Dinkins one of ACTE's most prestigious titles, National Teacher of the Year, at the 2018 ACTE Awards Banquet. This year, we are excited to have Dinkins on stage again as the keynote speaker, to help celebrate this exciting evening honoring the best in CTE.

Liz Dinkins represents ACTE's Region IV as graphic communications instructor at Francis Tuttle Technology Center in Oklahoma City, Oklahoma, where student success is her top priority. Dinkins empowers her students to take ownership of their learning, allowing them to determine in what order they want to learn curriculum, based on their interests, and thus keeping them engaged.

The ACTE Excellence Awards Gala is generously sponsored by Goodheart-Willcox Publishers, Stratasys Inc., CareerSafe and Express Employment Professionals.

Everyone's a winner in Anaheim!

But only some take home the prize. At the 2019 Awards Gala, ACTE will recognize the national finalists and winners of the ACTE Excellence Awards:

- ACTE Teacher of the Year, sponsored by Express **Employment Professionals**
- ACTE New Teacher of the Year, sponsored by Goodheart-Willcox Publishers
- ACTE Career Guidance Award
- ACTE Teacher Educator of the Year
- ACTE Lifetime Achievement Award
- ACTE Administrator of the Year, sponsored by Goodheart-Willcox Publishers
- ACTE Business Leader of the Year
- ACTE Postsecondary Teacher of the Year, sponsored by Goodheart-Willcox Publishers
- ACTE Business of the Year
- ACTE Carl Perkins Community Service Award
- ACTE Champion for CTE Award
- ACTE Business-Education Partnership of the year

Two additional awards will be presented:

- CareerSafe Safety Educator of the Year, sponsored by CareerSafe
- ACTE Student Trophy Design Contest Winner, sponsored by Stratasys

ACTE's CareerTech VISION 2019 would not be possible without the generous support of our sponsors. **Thank you!**





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Companion Events

The education and networking opportunities never stop, not at VISION. Three companion events up the ante for ACTE members, CTE stakeholders and all those invested in agricultural education and construction career pathways.



The 2019 National Association for Agricultural Educators (NAAE) Convention will take place Dec. 3–7 at the Anaheim Marriott in Anaheim, California: naae.org/convention2019/

ACTER

The 2019 CTE Research and Professional Development Conference, Growing CTE Through Innovative Research and

Professional Development, is coordinated by the Association for Career and Technical Education Research (ACTER) and will be held in conjunction with ACTE's CareerTech VISION 2019: acteronline.org/conferences/



The annual Construction Career Pathways Conference from the National Center for Construction Education & Research will take place on Dec. 4 in Anaheim, California: #nomoreskillsgap pathways.nccer.org/2019-details/



Prototyping, Piloting & Program Implementation: Starting a Cybersecurity Pathway

By April Pelfrey & Philip Peavy



ducation communities across the country are investing in career and technical education (CTE) pathways as a means to get students interested in a career field prior to finishing high

school. Studies show that this investment increases student retention and graduation rates. The challenge for school systems lies in developing and maintaining these pathways to keep pace with evolving job market trends, and to ensure that students are equipped with the right skill set to be successful.

The demand for skilled cybersecurity professionals continues to increase — along with it, the number of connected devices: currently more than 23 billion devices within the "internet of things" (Robbins, 2016). Meeting this need will be vital to the success of the world economy. Consider that number — 23 billion connected devices in a world with an estimated population of only 7.7 billion — and then consider its impact on the general public's security online.

It is predicted that cybercrimes will cost the economy more than \$6 trillion annually by 2021 (Morgan, 2018). The rate at which cybercrimes occur is advancing, and cybersecurity professionals have a responsibility to keep up, to stay ahead, to keep businesses safe. Business owners; local, state and national government systems; schools; and private residents that own devices connected to the internet are all sus-

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ceptible to cyberattacks. It is our role, as career and technical educators, to expose students to careers in cybersecurity and to prepare them with skills and experience necessary for success within this expanding and ever-changing career field.

Implementing a Cybersecurity Pathway

The cybersecurity program in Gwinnett County, Georgia, and its relevant Academic Knowledge and Skills Standards (AKS), are built on a foundational pathway from the Georgia Department of Education (DOE), which features three standards-driven courses and an end-of-pathway exam. All high schools in the county already offered the required first course, Introduction to Digital Technology, as it is the mandatory first course for several pathways in the state. In 2018-19, Central Gwinnett High School launched a pilot for the second course in the pathway, Introduction to Cybersecurity, and will complete the pathway in 2019-2020 with the introduction of Advanced Cybersecurity. Students who complete the pathway and the requisite exam will receive an industry standard certification; real-world certification will not only help students be marketable as they enter the workforce but will provide a tangible answer to 'why?', emphasizing the importance of their learning.

The "why" is equally important as you begin to market the program to the students, parents, administration, partners and community stakeholders.

The U.S. Department of Labor's Bureau of Labor Statistics shows a projected 28 percent increase in information security analyst positions from 2016— 2026, whereas other occupations are projected to show only a seven percent increase (Fayer, Lacey, & Watson, 2017). The need is convincing and the question becomes,

"How can I start a cybersecurity program at my school?"

The first concern is finding qualified teachers and curricula to guide the courses. Cybersecurity in education is new and, as cybercriminals grow savvier, the role of cybersecurity in the workforce is constantly evolving. So where do you start? In Gwinnett County we learned that the first and most important step is to obtain buy-in from the community members, your administration and the students.

The Administration

To administration we talk about the job market and industry, and we take steps to show why it is important to offer cybersecurity courses in schools. What do our students get out of the courses? Ultimately, how are the students going to become self-sufficient adults? It is important to offer courses that culminate with certifications that students can transfer and use in the industry.

For students who wish to enter the workforce directly, they will do so in possession of a credential that is in high demand in the industry. For those planning to pursue postsecondary education, certification will help them stand out among an ever-growing pool of applicants. Businesses are in desperate need of filling the cybersecurity workforce with employees who have the skills to maintain safety and information security online.

The Business Community

The best part here is, you don't have to sell them on the importance of cybersecurity; it's likely many business owners have already convened stakeholders to protect the company's interests and its employees. But it is important, nevertheless, to obtain support for your program from the business community. These are the people you rely on to tailor your program to meet industry needs for cybersecurity. They can answer the important programmatic questions: what are they looking for in employees, what type of cybersecurity positions are available, and what are the requirements for those positions? This information is critical to the development of an effective cybersecurity program and will continue to be of importance when updating the courses and marketing the pathway to students.

Financial support is also important to receive from business partners. You might find community business owners are willing to invest in schools because it helps them to fill a pipeline of qualified employees in the long run. Businesses can show support by donating old equipment for use in the classroom, offering field trips and mentorships, and sponsoring guest speakers to come into the class. This is so important when building your program. Keep the business community involved.

The Students

Show them the money. Seriously, talk to them about the jobs, the salaries and the requirements, and convince them that it is accessible and achievable. Talk to them about the cool things you plan to do in class. Throw in some ethical hacking. It's a catchy term and they think it is so cool. But most importantly, talk to them about the information they will learn in the class, and always bring it back to the potential certifications and job opportunities it will open up for them.

Create flyers and information sheets to hand out. Share information on social media, through newsletters and schoolwide applications. Market your new cybersecurity program to students as if you are trying to sell the coolest thing because, really, you are. With new course offerings and a chance to earn real-world industry certification, you are giving them a chance to create a future in a promising career field.

I ask my students, "How are you going to pay your bills?" The common answer now might be, "I'm going to be a YouTuber" or "I'm going to be a social media influencer." These are perfect openings for you to then ask, "Well, what are you going to do about all the cyberattacks on your sites when you become famous?" The ultimate goal is for us to provide opportunities for students that will help them become successful adults.

The Teachers

With support from key decision-makers acquired, you'll need to obtain buy-in from those who will lead the courses themselves: the teachers. In doing so you will need to consider the cost of setting up classrooms suitable for students to demonstrate mastery of the content. Best case scenario, this might mean a classroom with its own network and 35 computers, one for each student to take apart. But, let's face it, there are few of us teaching in best-case-scenario schools.

Gwinnett County needed a cost-efficient way to teach to a large number of students and, in doing research, we found TestOut — a company that builds curriculum to include virtual labs, which allow students the hands-on feel of working in an office while preparing for the cybersecurity certification exam. (The best part is, the teachers can learn along the way! This means you don't necessarily need a former cybersecurity expert to teach the course. You only need teachers willing to learn.)

Helpful Resources

States and school districts across the country are adding cybersecurity pathways and building programs within school systems, finding new ways to keep students engaged and learn important concepts as they master skills they will need to be successful in cybersecurity career fields. As we use TestOut to help prepare students for the end-ofpathway certification exam, they have an opportunity to explore concepts in LabSim, a virtual office environment where students can practice skills needed until they are mastered. The environment is customizable and enables the teacher to design tasks and build differentiation based on individual skills within the classroom; work through lab scenarios with the class as a whole or encourage students to work independently through the labs. Exam questions, embedded in each chapter, appear similar to those featured on the certification exam, and additional resources provide background and supporting information for teachers.

Additionally, TestOut programs feature their own end-of-course exams if an end-of-pathway exam such as that offered in Georgia is not yet available in your state or district. As a bonus, they are free to the students taking the course. Along with TestOut, Gwinnett County has built lessons around cryptography, ethical hacking, and other various types of hacking to ensure we meet all of the standards of the Introduction to Cybersecurity course for our state. We also allowed some time for students to build a computer, using donated

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computers and parts from the business community; these students built Raspberry Pie servers that they then spent a little time hacking. Building these lessons around interactive curriculum, with TestOut and through the support of vital community stakeholders, allowed us to keep students engaged throughout the year.

As you plan to implement your own cybersecurity pathway for students, use the many resources available to you, to their full advantage. Students will enjoy and learn from those in the industry, and the business community will benefit from a workforce skilled in cybersecurity.

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Learn more from April Pelfrey and Philip Peavy when you attend their session, "Teaching Cybersecurity Through Virtual Labs and Hands-on Experience," on Thursday, Dec. 5, at ACTE's CareerTech VISION 2019. The presenters will lead attendees in a discussion on how to effectively incorporate cybersecurity within your school system as well as marketing tips and the supporting data needed to sell a new program. Participants will have an opportunity to explore a course using TestOut.

The full program guide can be found online at **careertechvision.com**.

ACTE)



supporting the Gender Expansive Student

By Shannon Sheldon

as anyone ever referred to you as a gender opposite of that with which you identify? How did it make you feel? If you

have never been misgendered, take a moment to imagine how it might feel to be constantly addressed as the incorrect gender. I speak from experience when I say that you are likely to feel offended, hurt and humiliated.

Being Misgendered

My name is Shannon Dean Sheldon, a name my parents found appropriate for a child regardless of sex assigned at birth. I am identified on my birth certificate as female and was raised by my

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parents as such. My hair was always cut in a carefree short hairstyle and dresses were only worn on special occasions. Some of my earliest memories include hearing questions such as, "What does your son want for dessert?" and "How old is your son?"

Angry and humiliated, I pestered my parents to have my ears pierced, which, in the 1970s, was a clear indication of the female gender. Unfortunately, the tiny studs I was allowed to wear didn't feminize my appearance and the misgendering continued until I grew my hair out and began wearing makeup. Though I am no longer misgendered in person, I still receive mail addressed to "Mr. Shannon Dean Sheldon" and I hear "may I speak to Mr. Sheldon" when I answer the phone. Over four decades later, I no longer take offense when I am misgendered but I cannot say the same for many of the students in my classroom.

Gender Binary vs. Gender Spectrum

Society places demands on us to conform to a gender binary (i.e., strictly male or strictly female) but students today embrace the concept that gender identity exists on a spectrum and may actually differ from sex assigned at birth. Gender expression, the way in which one communicates their gender identity, may evolve or fluctuate over time (Baum & Westheimer, 2015; Murchison, 2016.) Methods of expressing gender identity include dress/attire, hairstyle, grooming, makeup, mannerisms, behavior, tone of voice and more. It is becoming more common to see students blur the boundary between what is considered masculine and feminine. For example, a male student may choose to wear eyeliner or a female student may opt to shave her head. Such students might identify as a gender different from their sex assigned at birth or they may simply be expressing their gender identity in less traditional ways.

Students who blur the lines between masculine and feminine are considered to be gender expansive (Baum & Westheimer, 2015; Murchison, 2016.) Pushing the boundaries of what is generally accepted as appropriate is not a new concept; at one time it was considered unacceptable for a female to wear pants to school.

But what about students who choose to express their gender outside of the norm? As educators, how can we make all students, regardless of gender identity or expression, feel welcome, included and supported in our classrooms?

Reflect on Practices

Consider the myriad of ways in which gender expansive students are unintentionally excluded in our classrooms and schools. Reflect on some of the procedures and customs we employ that classify students according to the gender binary: lining up students by gender to facilitate movement between locations, seating and cap and gown color coding at commencement, and addressing a group as "ladies and gentlemen," to list a few.

Evaluate curriculum materials and classroom activities to assess whether they reinforce gender stereotypes. Question policies and materials that perpetuate traditional gender roles. Contemplate terms that exclude or assume one gender such as "man-made," "policeman," "wife" or "stay-at-home mom." Examine your personal belief system and how this manifests as a hidden curriculum. The gender binary is so ingrained in our vernacular that it is likely we are unaware that our language and customs exclude part of the population.

Model Inclusive Behavior

As you become aware of gender issues in your classroom you will begin to recognize opportunities to model inclusive behavior. If you have a student in your classroom who identifies or expresses their gender in a manner that differs from the gender on your class roster, resist the urge to inquire about the student's choice of appearance. If you have ever been asked why you made the decision to cut or color your hair, grow facial hair or get a tattoo, you know that such questions can feel like a judgment of your choice.

The first time a male student entered my class in a full face of makeup, rather than inquire why they made the traditionally feminine choice, I remarked, "Wow, you look great today!" The student's smile and look of relief is forever ingrained in my memory. With a single comment, that student was made to feel more comfortable in my classroom; they felt accepted and validated. It was this student who later helped me understand gender identity and expression, and who inspired me not only an ally but to become an advocate for gender expansive students.

Using Gender Pronouns

In addition to expressing gender through appearance, students express gender identity with pronouns. Most people simply identify with the pronouns that are congruent to their sex

Glossary

Gender: social construct that prescribes behavioral norms based on anatomy

Gender binary: the concept that gender is either male or female with nothing in between or outside those boundaries

Gender expansive: expressing gender outside of societal norms

Gender expression: the manner in which one displays their gender identity through appearance, mannerisms, etc.

Gender identity: personal interpretation of gender; may or may not align with sex assigned at birth

Gender inclusive: supporting all genders, regardless of identity, expression or sex assigned at birth

Gender pronoun: the pronouns one identifies with (e.g., she/he/they)

Gender spectrum: range of gender identities that exist between (or outside of) strictly male and strictly female

Safe space: a space designated as welcoming to all people regardless of gender identity or expression; a space were everyone is encouraged to be themselves

Sex assigned at birth: classification attributed to a person at birth based on the biology of reproductive organs

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assigned at birth (i.e., female students who use she/her/hers or male students who use he/him/his). However, some students use pronouns that do not correspond with their sex assigned at birth. Learning to navigate these waters can be difficult. Instead of assuming the pronouns students use, encourage them to identify their gender pronouns when you first meet.

When I introduce myself to a class for the first time, I say: "I am Shannon Sheldon and I use the pronouns she/ her/hers." This alerts students that I understand, and that I am sensitive to, the concept of gender pronouns and gender identity. I instruct my students to introduce themselves in the same way so the entire class discovers how each should be addressed. If I make a mistake in class and misgender a student, I apologize, correct myself and then proceed. Modeling this behavior contributes to the classroom culture of acceptance and demonstrates to students how they should address each other using the correct pronouns.

When in doubt of what pronoun to use, simply use "they" or the student's name instead of a pronoun. For example: "Did you hear what they said? Did you see Richard's work?"

Opportunities to Improve

Other ways of showing support for students who identify outside of the gender binary:

- Listing your gender pronouns on your business card and in your email signature
- Intervening in situations that involve name-calling, stereotyping and bullying
- Hanging gender inclusive and safe space signage to alert students that your room is a welcoming and accept-

ing environment for all students regardless of gender identity or expression

- Advising a Gay-Straight Alliance (GSA) or similar student club that advocates for inclusion of all students
- Participating in professional development to improve your practice

Shannon Sheldon, CFCS, is a Las Vegas native and proud ally who uses the pronouns "she/her." Sheldon has been a career and technical educator for almost two decades in the nation's fifth largest school district. She holds a bachelor of science in clothing and textiles from the University of Central Missouri, a master's degree in secondary education from the University of Nevada, Las Vegas, and is pursuing a Ph.D. in teacher education. Email her at shannonsheldon702@gmail.com.



Shannon thanks former student Nathan Willey for their inspiration and guidance.

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Learn how educators can do more to support gender expansive students in the classroom, when Shannon Sheldon presents "Break Away from the Binary: Gender Inclusive Classrooms" on Friday, Dec. 6, at ACTE's CareerTech VISION 2019. Session attendees will receive two pronoun pins, one to wear and one to give, while supplies last.

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View the complete VISION program guide online at **careertechvision.com**.



ACTE STATE LEADERSHIP

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State Leadership Training is a one-year program to develop state and regional association leaders, as well as your up-and-coming leaders, through specialized training in association management and leadership development. The sessions will be scheduled as a preconference as follows:

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WE ARE CLASS DISRUPTORS

By Peggy Bridges & Steven Bridges



alt! Who goes there?

Are you friend or foe? Hero or villain? Are you here for disruption or order?

In today's story, the correct answer to these questions may not be what you think. More often, media and popular

culture are flipping the script: Villains have a heart and disruptors have good intentions, while heroes can be misguided and authority figures struggle with power issues.

Don't rock the boat!

Don't muddy the waters! Don't disrupt the norm!

Phrases, thought processes like these were once ubiquitous. Disruption was viewed as a bad thing or with negative connotation. A lack of disruption was once equivalent to structure, order and progress. Disruptors were always the villains in the story.

Today, however, disruption has taken on an entirely different value than what it had before. Rather than being viewed as an inhibitor of progress, disruption is now viewed in some realms as an avenue for progress. Industry has discovered the value of disrupting what is good to get to what is better, or even what is best! Netflix disrupted the video store industry. Amazon has disrupted brick and mortar retail. The mobile phone has disrupted the computer, television, music, camera, calculator and GPS industries. As technology moves forward, so, too, must related industries that rely on technology in order to thrive. Those that don't will struggle to find continued success, and education is not immune.

Whether in the classroom or in the world of business, the ability and willingness to adapt to change can be a primary contributor to success. Of course, being labeled a disruptor still carries its connotation of villainy — but only to those who resist change.

What does disruption have to do with the classroom?

In an article published by *The Scientific World Journal* entitled "Student Classroom Misbehavior: An Exploratory Study Based on Teachers' Perceptions," researchers revealed several activities that teachers consider disruptive. Those activities range from talking out of turn to outbursts of aggression and from students getting out of their seat to challenging the teacher's authority. And, interestingly enough, the factor that seemed to most contribute to disruptive activity was boredom (Sun & Shek, 2012).

Barring few exceptions, students rarely aim to disrupt a lesson. What they are often aiming to disrupt is their own boredom. But what causes boredom or a lack of engagement in the classroom? Is it the student's responsibility to engage with the lesson or is it the teacher's responsibility to provide the opportunity for student engagement? I would propose that it's both but with a heavier responsibility on the latter.

Students disrupt where there is opportunity to disrupt. Student engagement, however, supersedes disruption. Therefore, based on this premise, teachers should employ what we call positive disruption. The idea is simple: Beat students to the punch; disrupt your own class before the students have the opportunity. How? By disrupting the usual routine of classroom management and behavior through planned, purposeful student engagement activities.

Teachers become the disruptors.

Disrupting a class for the sake of disruption, however, would not be productive and is not what I am recommending. Nor am I saying that employing a few engagement activities will somehow magically transform students into starry-eyed pupils who soak up every detail of the lesson. What I am suggesting is that planned, purposeful engagement activities will help to disrupt an expected routine and create a platform for focused learning. The key word here is purposeful.

What is the intended purpose for the lesson being taught? Do the students know the purpose? Do they know why they are learning what they are learning? Do they care? Have they been given the opportunity to care or told why they should care? Caring is an emotional response.

Activities that purposefully engage students on an emotional level are far more productive than repetitive assignments or non-purposed activities. Links between emotions and memory have been studied since the time of Sigmund Freud and still concern social scientists today. When planning lessons with engagement activities, career and technical education (CTE) teachers should consider how "emotionally charged situations can lead us to create longer lasting memories of the event. When we are led to experience feelings of delight, anger or other states of mind, vivid recollections are often more possible than during everyday situations in which we feel little or no emotional attachment to an event" ("Emotions and Memory," n.d.).

Presenting a scenario that provokes an emotional response, whether it be excitement, joy, anger, or even sadness, will increase the chances that students are retaining the information shared in that moment. If the intended purpose is to have students capture information and store it for later recall, that information should be introduced and discussed in such a way that will elicit an emotional response.

Play on Words

An activity that evokes the emotional response disruptors seek is one we call Play on Words. Similar to the television show "Whose Line Is It Anyway?," this activity can bring the lesson to life. To facilitate a Play on Words activity, the teacher should consider all of the critical points that will be covered in the lesson and write brief descriptions of each on slips of paper. Students are then divided into teams of four, and each team draws a slip of paper from a hat. Only two of the students on each team should be allowed to read the information on the paper. The other two have to guess what the point is. Without speaking, the students are given 60 seconds to act out or demonstrate the point. Students may make noises but should not talk. If the answer is guessed by the other two team members, the team gets 10 points; if not, the team is instructed to reveal and discuss how the demonstrated actions address the point. Students are engaged, and the activity will inspire interesting and funny visuals that may help them recall important information later (Bridges & Bridges, 2019).

Certain industry segments (e.g., hospitality, restaurants and retail) demonstrate a clear understanding of this concept. They want their brands to be remembered. So, what do they do? They create an emotional experience around their products and services. Step into any hotel, eating establishment or store, and it becomes quickly apparent that a major concentration of effort has been placed on the experience as well as the product. From the music they play, the colors on the walls, and the temperature in the room, to the customer service they provide, business is all about the experience. Brands want customers to feel a certain way about them so that, when the time comes, customers will remember, return and tell their friends.

Teachers also have a brand. Students brand them, and their subjects, based on the experiences they have had in their class (Bridges & Bridges, 2019). A good teacher can make a student like or love even a boring subject by the way they present their brand.

Clear as a Bell

Clear as a Bell is a fact-finding game or scavenger hunt that can easily be incorporated into student learning. Here is how it works. Students should be divided up into small groups, and each group given a bell and the textbook, chapter or location assignment of critical lesson information to be identified. This can also work on the computer, via internet search, or even on cell phones. (Teachers should be careful to properly word search requests to avoid inappropriate search results!) The teacher should then ask questions while students race to find the answers. The first group to find the answer rings their bell and reports the answer: the answer can be recorded on a board and/or discussed for clarity. Score should be kept for each group and tallied at the end. Winners might receive a prize (Bridges & Bridges, 2019).

These are only a few of the ways that teachers can begin to disrupt their classrooms. The possibilities are endless. In fact, we believe there are four key areas primed for teacher-led disruption:

- The class environment
- The delivery
- The lesson content
- And even the deliverer

Disrupting the class environment might involve changing anything from the location of your class to the furniture in your classroom. This could even include the mood, the lighting or perhaps the music that you play. Disrupting your class environment can go a long way toward creating an atmosphere of excitement and adventure.

Disruption to the delivery of your lesson entails altering your usual form of content delivery. If you are a lecturer, consider using videos, projects or research-based lessons. There are numerous ways to relay information; explore other methods to see which ones work best for your learners.

You may not always have a choice about the content you must deliver but you can consider disrupting the pace and flow of that content. Consider using brain breaks, dance breaks, stretch breaks or even pulse checks to disrupt the flow of your content lesson. Doing so will help keep students engaged.

A bold teacher might consider disrupting the deliverer. You may be thinking, "But I am the deliverer!" Exactly! Sometimes your students need to hear from someone other than you. Everyone has a unique style and a unique viewpoint on the information at hand. Step back and let someone else take the reins. You may find that your students hear and receive the information in a completely different way than if it were coming from you.

Final Thoughts

Class disruption is more than student engagement activities. It's more than throwing the teacher's guide out the window. Class disruption is a mindset of purpose and creativity.

A class disruptor is someone who understands the value of disruption and breaking out of the norm. A class disruptor understands that they have a brand to create, promote and protect. A class disruptor uses disruption to their advantage and disrupts the would-be student disruptors through purposeful engagement. A class disruptor is indeed the hero of their story!

So I challenge you. No. I dare you to become a class disruptor and make your class more amazing than ever! Start now and begin to brainstorm ways you can disrupt the same old routines and class assignments.

And then go disrupt something...

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Make plans now to attend the "We Are Class Disruptors" workshop on Thursday, Dec. 5, at ACTE's CareerTech VISION 2019. There, presenters will explore disruption in detail, offering various methods for use in the classroom. Participants will receive a free book while supplies last.

The full program guide can be found online at **careertechvision.com**





Campus Mentors Bring Perkins V Innovation to Scale

By Leah Wasburn-Moses

66 I didn't have good grades before, but now I actually take the time to think about the future. **99**

THIS HIGH SCHOOL FRESHMAN ATTRIBUTED HIS SUC-CESS TO CAMPUS MENTORS, A ONE-ROOM CAREER and technical education (CTE) program housed on a college campus and supported by hundreds of teacher candidates. This model results in improved grades, credit attainment and behavioral record, placing young people at risk on track for college or career success.

What is Campus Mentors?

First defined in *Techniques*' April 2012 "Promising Practices" issue, the Campus Mentors model involves:

- A CTE program operating on a college or university classroom during the school day
- Serving youth at risk, identified by their academic and behavioral record
- Daily tutoring and one-on-one mentoring provided by teacher candidates

An eight-year pilot that took place on the campus of Miami University in Oxford, Ohio, from 2009 to 2018 showed significant growth in grades, credit attainment and behavior among participating youth, as measured by student GPA, credits earned and behavioral record (Wasburn-Moses & Noltemeyer, 2018). This pilot began as a partnership between Butler Technology and Career Center, the Talawanda School District, and Miami University in southwest Ohio. Because of the need for dropout prevention, the partners targeted ninth and 10th grade students determined to be at risk for school failure based on their school records. These young people had failed multiple courses and qualified for free or reduced lunch. They also demonstrated low school motivation and engagement.

A single teacher taught 10th grade students in a morning session and ninth grade students in an afternoon session, and the two groups switched places traveling to or arriving from their home schools — at lunch. While on the university campus, students engaged in online high school coursework, supported by both academic tutors and one-on-one mentors. Academic tutors were teacher candidates taking an introductory-level education course; each day the teacher would assign tutors to students who needed the most support in their online coursework. Oneon-one mentors were college students electing to take a one-credit-hour class connected with the Campus Mentors program. Mentors were matched with high school students to support their social-emotional needs; the mentors' curriculum was based loosely on the evidence-based Check and Connect dropout prevention model from the University of Minnesota.

The content of the online coursework was selected by home high schools based on the students' needs. For example, if ninth grade students had failed world history at their home high school, world history would then be offered on the university campus in the following year (Wasburn-Moses & Statt, 2012).

What are the benefits of Campus Mentors?

The most immediate benefit of the Campus Mentors model is to participating high school students, in the form of improved grades, credit attainment and behavioral record (Wasburn-Moses & Noltemeyer, 2018). Additionally, Campus Mentors exposes teacher candidates to specific teaching practices before they even enter the classroom. Identified benefits for tutors and mentors include a greater understanding of the complexity of the lives of youth at risk, experiencing a positive teaching model, and enhanced communication skills (Wasburn-Moses, Fry, & Sanders, 2014).

The Campus Mentors model can be used by states or districts to pilot any new curriculum, career pathway or technology. For example, if a state wishes to pilot a new mental health curriculum, it can establish Campus Mentors sites to implement and monitor outcomes, using university researchers for data collection and analysis. Simple and accurate data collection and analysis could result in rapid scale-up. Similarly, if a state wishes to pilot a new career pathway, it can use Campus Mentors to determine how to structure the pathway in a manner that leads to desired outcomes. Again, the ability to implement in a controlled setting and with ease of access to data would assist with understanding outcomes and preparing to scale programs statewide.

Flexibility to meet the needs of states and districts is the hallmark of Campus Mentors. In today's climate emphasizing the role of innovation in CTE, Campus Mentors can assist states in tackling major tenets of Perkins V, including:

- Piloting new programs addressing high-demand career pathways
- Supporting new STEM or handson learning programs
- Piloting competency-based curricula or programs
- Seamless transition between secondary and postsecondary education
- Serving special populations
- Expert assistance in needs assessment, data collection, analysis and/or dissemination
- Support in implementing state plans
- Maximizing use of funding through partnership
- Professional development needs (Advance CTE, 2018)

Table 1: Campus Mentors Benefits

States	Districs	Universities
Pilot or scale up any CTE program with ease	Improved grades and credit attainment	Up to 150 field placements with one partnership
Meets Perkins V goals	Hundreds of hours of one-on-one support	Teacher candidates connect with learners at risk
Positive location	Positive location	Accessibility for students and faculty
Hundreds of hours of one- on-one support	Close contact with university	Low cost, low maintenance
Low cost, low maintenance	Low cost, low maintenance	Greater control over teacher candidate experiences
Model flexibility, including student grade and population, subjects taught, curriculum, career pathway	Model flexibility, including student grade and population, subjects taught, curriculum, technology, career pathway	Meets accreditation targets
Exposes thousands of teachers to CTE programs and content	Positive role models	Blends teaching, research, and service

Table 1 outlines specific benefits of using Campus Mentors for states, districts and universities. In general, its small, easyto-manage incubator sites provide intensive supports resulting in valid and reliable data (Wasburn-Moses & Noltemeyer, 2018). All parties benefit from its location, low cost and flexibility (Wasburn-Moses & Statt, 2012).

What is the evidence?

During the eight-year pilot, youth GPAs exceeded that of their peers by nearly one point on the traditional 4.0 scale (see Table 2). The vast majority of participating freshmen earned sufficient credits to be promoted to sophomore status by the end of the school year, and both freshmen and sophomore participants showed a statistically significant decrease in behavioral referrals (Wasburn-Moses & Noltemeyer, 2018). When asked to describe the impact of Campus Mentors, youth participants indicated the greatest impact was in improved school performance. They also reported changing perceptions about attending college and defining their future plans (see Table 3) (Tanner & Wasburn-Moses, 2014).

Further, due to the close partnership with the university's teacher education program, more than 1,000 teacher candidates were trained in methods to support youth at risk. Outcomes for teacher candidates included self-reported improvements in communication skills and enhanced understanding of the complexity and diversity in the lives of the youth they served (Wasburn-Moses, Fry, & Sanders, 2012). Based on youth outcomes, the model was recognized as an "innovation" by the American Association of Colleges for Teacher Education (AACTE) in 2016, and it also meets program impact standards set by the Council for the Accreditation of Educator Preparation (CAEP, 2013).

How can Campus Mentors meet goals?

Campus Mentors meets goals through flexible CTE-higher education partnerships, bringing hundreds of hours of support to youth at risk. Implementation begins with identification and merging of goals with partners. For example, states might seek additional support for special populations or to pilot a new CTE program targeting an in-demand career pathway. Districts' goals might be to expand dropout recovery options, provide more support for an existing program or pilot online courses, particularly with Perkins V's focus on special populations (Advance CTE, 2018). Universities need field placements for teacher candidates, particularly early placements during which college students are less likely to have access to a vehicle or time to devote off campus. Universities can also use youth outcome data from this partnership model to meet accreditation targets.

In order to implement Campus Mentors, each district/university partnership must meet three preconditions:

1. **Identify project manager:** This individual is needed to coordinate the implementation process and scheduling. The project manager could be faculty or administration at either the district or the university. Estimated time commitment is two to three hours per week during planning, and one to two hours per week during implementation. This individual should have skills in collaboration and organization, and show persistence in following through with procedure.

2. **District assigns teacher and transportation:** This partnership requires a strong, experienced teacher to lead with direction and creativity. The teacher's salary is paid by state subsidy just like other teachers. Each Campus Mentors site can be formed by relocating an existing CTE program or through the creation of a new program. Youth transportation is the single recurring cost of the partner-

Table 2: Campus Mentors Pilot Outcomes

Student Outcomes 2014-15

	GPA	Credits	% Qualify as Sophomores
Our ninth graders	2.5	6.7	92%
Comparison group	1.5	4.2	17%

	GPA	Credits
Our tenth graders	2.8	7.1
Previous year's performance	1.9	5.9

Student Outcomes 2015-16

	GPA	Credits	% Qualify as Sophomores
Our ninth graders	2.3	6.4	100%
Comparison group	1.4	4.2	27%

GPACreditsOur tenth
graders2.68.3Previous
year's
performance1.54.6

GPA

2.6

19

Our tenth

graders

Previous

year's performance

Credits

7.7

56

Student Outcomes 2016-17

	GPA	Credits	% Qualify as Sophomores
Our ninth graders	2.6	6.8	92%
Comparison group	1.8	4.9	55%

Student Outcomes 2017-18

	GPA	Credits	% Qualify as Sophomores
Our ninth graders	2.5	6.8	93%
Comparison group	2.1	4.9	40%

ship. Many districts already transport youth to and from the local university campus for other purposes, so this partnership does not necessarily involve new bus routes.

3. University provides classroom and parking: Campus Mentors requires a dedicated classroom on a college or university campus. Both classroom space and parking are a premium on GPACreditsOur tenth
graders2.66.9Previous
year's2.16.2performance2.16.2

many college campuses. Although these commodities can present a barrier to implementation, both can be obtained in support of partnership work, particularly if requests are made early. The project manager will be needed to coordinate carefully across K–12 and higher education in order to understand processes and track progress of these requests.



Fellowship

PROGRAM

opportunity for professional development, increased policy knowledge and leadership!

The ACTE Fellowship program was a catalyst for much of my growth as a CTE professional. I was able to develop my knowledge base, my professional network, and my understanding of ACTE. I have become more confident in my advocacy efforts and I strongly encourage others to consider applying for the ACTE Fellowship Program. It certainly had a positive influence on my life.

- Patrick Biggerstaff,

former Region III Fellow, former Indiana ACTE President, and currently the ACTE Administration Division Vice President

ACTE is accepting applications for fellows from all of the Regions and from some select divisions.

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Fellows receive complimentary registration to VISION, the National Policy Seminar and a \$1,000 stipend to offset travel expenses.

More information is available at www.acteonline.org/fellowship.

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Table 3: Campus Mentors Pilot Outcomes

After these three preconditions are met, the team is ready to begin the work of implementation. Major facets of the process include selecting college courses and partnering faculty to provide assigned tutors and mentors, determining a daily schedule, and identifying student participants. An implementation toolkit can be obtained from Campus Mentors staff.

What are next steps?

In sum, our eight-year pilot has demonstrated that Campus Mentors improves grades and behavior of youth at risk. The model also trains hundreds of teachers in understanding these students and their needs through an on-campus showcase. Next we must use the results of our pilot to benefit young people in other locations to meet local and state needs.

Leah Wasburn-Moses, Ph.D., is professor of educational psychology at Miami University. A former special education teacher at Jefferson High School in Lafayette, Indiana, her research is in innovation in teacher preparation. She is currently writing a book on the past, present and future of student teaching, in press with Lexington. Email her at wasburlh@miamioh.edu.

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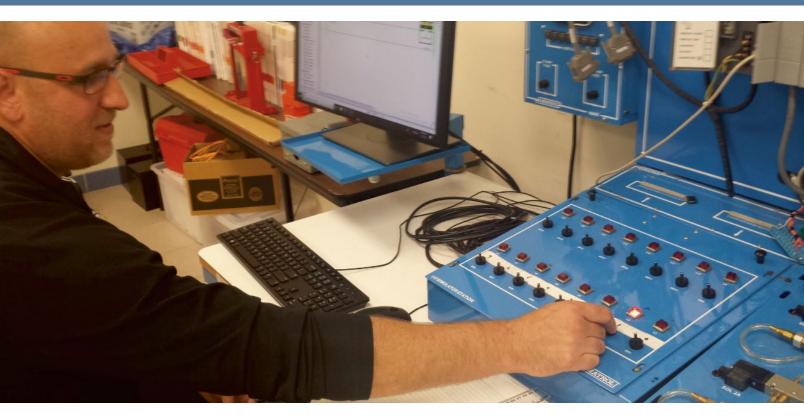
Campus Mentors staff offers free technical assistance to any state or district using Campus Mentors to maximize Perkins V goals and resources. Technical assistance is available in the form of conferencing, implementation resources, and personalized planning documents. For more information, visit campusmentors.org.

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Торіс	Response	Percent Responding	Representative Quote
Reasons for participation	Fulfill school re- quirements	71%	If I hadn't come here, I wouldn't have put any thought into going into [CTE]. But Mr. M encouraged me and told me that I could do it.
Learning outcomes	Ability to succeed in school	33%	School isn't your enemy. It can actually help you find your tal- ents and what you're good at.
Learning outcomes	Greater sense of empathy	24%	Everyone has their own flaws. Some people can or can't fix them. I'm just like people in some ways and different in others.
Program impact	Changed thoughts about attending college	50%	I didn't have good grades be- fore, but now I actually took the time to think about the future. I want to be a nurse and take the two-year program at M University I realized that I like helping people, and nurs- ing is a good choice.
Program impact	Helped define future plans	45%	At first, I just wanted to gradu- ate high school and trim trees. But I got to look into [CTE] and I've decided to be a weld- er. Without [Campus Mentors] I wouldn't have the credits I needed I would say the pro- gram has opened a couple doors.
Program impact	Better outlook on life	29%	[Campus Mentors] improved how I look on myself in an ac- ademic view When I didn't think I could do stuff in school, I was really down on myself. I've realized I can do it, and I'm much happier.
Program impact	Better school performance	40%	I used to doubt myself that I could complete assessments. If I actually try, I can actually do it.

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Success in Bucks County: Postsecondary Industrial Maintenance Cohort Program

By Thomas Viviano

THE BUCKS COUNTY, PENNSYLVANIA, LOCAL MANUFACTURING COMMUNITY IS EXPERIENCING

increased demand for skilled industrial maintenance technicians (O*NET OnLine, 2019; Pennsylvania Department of Labor & Industry, 2019); to meet this growing need manufacturers are reaching out to their local community colleges to provide a skilled manpower base. Initially funded by the U.S. Department of Labor's Employment and Training Administration, in collaboration with the Bucks County Workforce Development Board (WDB), and supported by local industrial manufacturers, Bucks County Community College (BCCC) offers accelerated 12-week cohort classes that focus on developing vital industrial maintenance skills needed, and found lacking, by local industry.

Table 2 shows wages and employment projections for the high priority occupation of industrial maintenance mechanic through 2024 for Bucks County, Pennsylvania. There is a projected 19.5 percent increase in the need for these technicians, reflecting 39 openings (High Priority Occupations, 2019).

It is impossible to learn all that there is to learn in 12 weeks, but the students

exit the program prepared to study under the tutelage of experienced and skilled maintenance persons within a manufacturing plant. The students undertake a broad education in electrical and mechanical fabrication, along with construction, troubleshooting, and analysis of hydraulic, pneumatic and electrical systems. They are taught blueprint reading, aspects of measurement (including calipers and micrometers), and all of the associated mathematics involved in becoming well-rounded maintenance technicians. Multiple instructors address all aspects of the electrical and mechanical compo-

Employ	/ment	Percent	Projected Annual
2016	2026	Change	Job Openings*
89,700	94,700	6%	9,800
Employment			
2016	2026	Change	Job Openings*
6,020	6,550	+9%	680
	2016 89,700 Employ 2016	89,700 94,700 Employment 2016 2026	20162026Percent Change89,70094,7006%Employment 2016Percent Change

2018 High Priority Occupations for Bucks County Workforce Development Area

			Wages (2017)			Employ	ment		
SOC Code	SOC Title	Educational Attainment	Entry Level	Annual Average	Exper. Level	Estimated 2014	Projected 2014	Percent Change	Annual Openings
49-9041	Industrial Machinery Mechanics	LT OJT	\$30,750	\$49,630	\$59,060	870	1,040	19.5%	39

TABLE 2: High Priority Occupations for Bucks County Workforce Development Area (Pennsylvania Department of Labor & Industry Center for Workforce Information & Analysis, 2019)

nents; these instructors come to BCCC with extensive education and experience in their chosen fields, and all demonstrate passionate enthusiasm about what they know and are able to teach, which carries over to student learning.

Skill Development Through Industry Partnerships

A local manufacturer's committee was formed to determine the needs, interests and deficiencies in the current workforce and it is this committee that drives the curriculum of the program. Mateen Afzal, the owner and chief executive officer of PDC Machines in Warminster, Pennsylvania, stated, "We currently have six students from the combined metal work training and industrial maintenance programs from Bucks County Community College. The programs provide a solid foundation of skills that we can build on in our company's training programs."

With support from local industry leaders in Bucks and Montgomery Counties, Pennsylvania, the industrial maintenance cohort program was developed to provide exposure and introductory skills in multiple craft areas, and students can determine which of these skill areas they would like to focus on in the future. Afzal reflected on his mission statement, which includes "ongoing education of his employees," and expressed his feeling that a strong relationship with the local community college presents a viable path to strengthening workforce's academic and performance skill levels.

Kirk Palermo, vice president of the specialty heat treating facility Vacu-Braze, in Quakertown, Pennsylvania, became involved after BCCC completed its first cohort session. "I saw an article in the local newspaper about the program and about the placement process of the students and I knew I just had to be involved." Palermo believes the industrial maintenance program will provide graduates with a competitive advantage.

"This is exactly what we need," he continued. "Our country is struggling to get young people into the high-skill, high-tech end of manufacturing and this program addresses that need." I asked him what he looks for in the candidates that he hires and he had this to say: "We look for candidates who like to work with their hands and minds, and who possess all of those employability skills that we are looking for." Employability skills include coming to work every day, being on time, being a team player, leadership, and an ability to demonstrate respect for all people regardless of their diverse backgrounds. "Our skilled workforce is retiring," Palermo said, "and we're looking to recruit a blend of experienced and new employees, as this balance allows for smoother transitions forward."

Program Success

Kellen, a student from the first cohort, found that the training program provided a "much-needed and wanted" career opportunity after his position as an activities director for a local nursing home was eliminated in August. "Training was a whirlwind," said Kellen, who has a wife and daughter. Kellen said, at the time of graduation, that he was eager to start working in his new career. "As long as I use the skills I learned to grow and develop, it will be fine," he said.

Another graduate, Tom, was working a series of part-time jobs — after health problems curtailed his studies at Rochester Institute of Technology, where he was attending on an ROTC scholarship when he learned about the BCCC opportunity. Tom said he is "excited to continue his education without having to go back to school for two to four years" to get the skills he needs. "We got a firm foundation on a lot of things very quickly," said Tom. "T'm ready to get out there and be taught by an employer exactly how they want things done."

A single father of two teenage girls, James found himself performing landscaping work just to keep his family together. The future, he admitted, looked bleak. "It took me long enough to realize it," said James. "I enjoyed the work but I saw it was going nowhere."

Then last fall, James came across a newspaper ad for a new 12-week Industrial



Maintenance Training Program offered by BCCC. With the weather about to turn and his chances to work dwindling, James looked at it as an opportunity to try something different. It turned out to be one of the best decisions he ever made. "It's been a blessing," James said with a smile as he joined six other grads in the program's inaugural class. "I stepped out of my comfort zone and here I am."

A former student, Matt, said he joined the second cohort right after a neighbor brought him an article from the local newspaper advertising the program. "I was enrolled in the Criminal Justice Program at Montgomery County Community College but I couldn't see myself working behind a desk for the next two years. I need to work with my hands and mind so this looked like a great fit. The class was everything I expected and more," Matt said. "I especially liked the electrical wiring and relay control logic sections of the program but enjoyed the hydraulics, pneumatics and mechanical aspects as well." He also enjoyed the weekly tours of local manufacturers and called it a "creative way to introduce students to the world of manufacturing." Matt sees himself as a lifelong learner and may pursue engineering courses in the future.

Spreading the Word

Program entry is ideal for recent career and technical education (CTE) graduates; those learners with previous exposure to engineering-related technologies, electrical technology, welding and electronics already have a significant foundation in their craft. With an additional 12 weeks of more broad and rigorous training, these professionals can increase their marketability and wage-earning potential. The industrial maintenance program is open and free to anyone who is under- or unemployed and looking to embrace a new career working with their hands and minds.

The Industrial Maintenance Training Program at Bucks County Community College includes theory and hands-on skills assessment, and introduces participants to the fundamental concepts and skills required by electro-mechanical technicians in manufacturing and a variety of industries.



Students are able to earn eight mini stackable credentials in 12 weeks to prepare for entry-level positions in manufacturing. These credentials include:

- Math and measurement
- AC/DC electricity fundamentals and electrical fabrication
- Blueprint reading
- Hydraulics, pneumatics and mechanical systems
- Relay logic and programmable logic controller wiring and operations
- Personal finance
- Employability skills
- OSHA 10 and forklift training

We would highly encourage all manufacturers to partner with their local community colleges and/or four-year institutions, their WDB, and governmental grant-offering entities to begin to develop such a program that we believe would ameliorate the shortage of skilled craftsmen in their areas. We are currently operating at an approximate 90+ percent placement rate and our local employers could not be more satisfied with the program(s). Thomas Viviano, Ph.D., is currently an

adjunct teacher at both Bucks County Community College and Temple University. He received his doctorate in workforce education and development from Penn State University, his master's from Chestnut Hill College in Applied Technology, and his bachelor of science in career and technical education from Temple University. Email him at tviviano0857@gmail.com.

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EXPLORE MORE

For more information on the Bucks County Community College Industrial Maintenance Program initiative, please visit bucks.edu/academics/ cwd/industrial-tech/maint/.

PROGRAM FEATURES

- 12-week, Monday-Thursday daytime classes
- Friday morning company tours
- FREE for those who qualify through PA CareerLink
- Employer needs-driven
- High job placement rates
- Veterans strongly encouraged to apply

PROGRAM REQUIREMENTS

- Must be a U.S. citizen/possess a green card
- Must be 18 years of age with a high school diploma or GED
- Must pass a drug screening, background check, electro-mechanical aptitude test, and physical test
- Must have reliable transportation to commute to training and a variety of industry field trips
- Must be ready to work in industrial maintenance
- Program entry is competitive based on screenings and employer interview



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Join us this **Dec. 4–7** in sunny Anaheim, California, for ACTE's CareerTech VISION 2019, the premier annual event for career and technical education (CTE) professionals with a comprehensive agenda that:

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Discounted advance registration rates are available through **Oct. 25**. To learn more visit **www.careertechvision.com**.



ACTE Board of Directors Election

Voting for the 2020 ACTE board of directors election will open during CareerTech VISION on **Friday**, **Dec. 6**, and close at 11:59 p.m. EST on Monday, Jan. 6. Winners will be announced the week of **Jan. 7**. For more information about the election, including information on the positions and candidates, please visit **www.acteonline. org/board_election**.



Tailored Agenda for CTE Administrators

ACTE and the National Council of Local Administrators are pleased to host their annual Best Practices and Innovations in Career and Technical Education Conference this Sept. 25–27 at the Westin La Paloma Resort and Spa in Tucson, Arizona. Featuring tailored programming for CTE leaders, Best Practices will include session topics on business and industry partnerships, mentoring and preparing your CTE staff, marketing your school district, advocating and funding your programs, and more. Check out the complete agenda and register at www.acteonline.org/bestpractices.



Attend the Credential Summit

The 2019 Credential Summit, happening **Oct. 2–3** in Raleigh, North Carolina, continues the conversation to explore the world of credentials with industry and education experts from across the country. This year's keynote session features representatives from a smart city, a new Gen 6 facility and a technical college focused on building a skilled local workforce in Racine County, Wisconsin. View the complete agenda and register at **www.acteonline.org/ credential-summit-2019**.



New and Expanded Online Learning Network Now Available!

The newly launched CTE Learn offers an expanded collection of online professional development courses for CTE professionals, including eight free, ACTEproduced learning tutorials on focused CTE topics; free learning modules to help CTE professionals enhance their workplace skills; 150+ high-quality, affordably priced online courses that cover a wide range of instructional, leadership and career guidance topics. Each course takes approximately four hours to complete and comes with nationally recognized CEU credit. View the complete collection of offerings at www.ctelearn.org.

INSIDE ACTE

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High-quality CTE: Student Career Development

ACTE is continuing its highquality CTE series with a new publication, Defining Quality: Student Career Development, generously sponsored by Xello. This brief describes the criteria within the Student Career Development element of the ACTE quality framework, recommends types of evidence that programs can consider when assessing their performance on these quality criteria, and shares case studies of school districts and institutions that excel at providing career guidance, planning and exploration to students. Read this publication and the first brief in the series, *Defining* Quality: Business and Community Partnerships, at www.acteonline. org/high-quality-CTE.

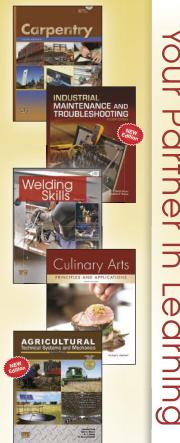
CTE Develops the Advanced Manufacturing Workforce

Manufacturing employs almost nine percent of the labor

force, with industry growth in high-tech subsectors like automotive and aerospace manufacturing. However, 89 percent of manufacturers face talent shortages. This updated Sector Sheet includes the latest information on occupational outlook, earnings potential and CTE programs that are preparing secondary and postsecondary students for careers in advanced manufacturing. Access this and other publications in the Sector Sheet series, generously sponsored by Pearson, at www.acteonline. org/sector-sheets.

Fellowship Program **Accepting Applications**

The ACTE National Leadership Fellowship Program is accepting applications for the 2020 class of fellows! Please consider taking part in this opportunity for professional development, increased policy knowledge and leadership development! The fellowship program requires a one-year commitment, January-December 2020. Applications are due Sept. **15**. More information is available at www.acteonline.org/fellowship.



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CAREER CURVE

WEB DEVELOPER

By Susan Reese



WEB DEVELOPERS DESIGN AND CREATE WEBSITES. THEIR DUTIES MAY BEGIN WITH CLIENT MEETINGS TO

determine the information and design that will best meet the client's needs. They write code, create and test applications, and integrate written material, graphics, audio and video into the website. Some may even work with the client to create content or direct others in creating content. Some web developers not only create websites but also work to monitor, maintain and update the site.

The Workplace

According to the U.S. Department of Labor's Bureau of Labor Statistics (U.S. DOL BLS) (2019), web developers work for organizations that provide computer systems design and related services; in the publishing industry; in management, scientific and technical services; and in advertising and public relations. A number of them are also self-employed.

<u>SCHOOL SPOTLIGHT</u> MT. HOOD COMMUNITY COLLEGE

OREGON'S MT. HOOD COMMUNITY COLLEGE (MHCC) OPENED IN 1966 AND TODAY SERVES

more than 33,000 students each year at its three campuses: the Gresham Campus, the Maywood Campus in Portland and the Bruning Center for Health Professions, also located in Gresham. MHCC offers 130 associate degrees, certificates and a number of university transfer options.

Among the options offered for high school students are College Now, in which students can earn college credit by taking college-level courses from MHCC-approved high school instructors, and Middle College, in which qualifying juniors and seniors take a part- or full-time college course load during the fall, winter and spring terms. The Mt. Hood Regional CTE Consortium is an educational program for high school and community college students based on industry needs, and it includes coursework in areas such as business, information technology and manufacturing. Also, through the TRIO College First program, advisors and staff mentor middle and high school students who might become the first in their families to attend college. This program, as MHCC (2019) notes, "helps promising young people create generational change" by helping them "build and realize a vision for themselves as college graduates."

Among the degree programs at MHCC is an associate of applied science (AAS) in computer information systems (CIS). MHCC notes that the general CIS degree is designed to be the foundation upon which the CIS options are rooted. In addition to courses in algebra, English composition, business project management and technical report writing, there are courses on subjects such as computer concepts, cybersecurity, desktop database, spreadsheets, networks and web authoring. In the final quarter, students participate in a capstone project for which they select and explore a topic that relates to their specific studies and their field of work. There is also a cooperative education internship.

Students in the MHCC CIS degree program can also receive specific training or earn a specialized certificate in areas that include technical support specialist, network and operating systems management, web developer and Apple mobile app developer.

The web developer/digital designer certificate requires 19 credit hours, which include Adobe Illustrator: Digital Art;

Education

Web developers need knowledge and understanding of computer programming languages such as HTML, XML, SQL and JavaScript as well as graphic design and multimedia publishing tools such as Flash and Photoshop. Therefore, while some may have only a high school diploma, an associate degree is more often required. Usually, this involves credentials in web design, computer science, programming or a related field. A number of two-year technical and community colleges offer programs in these fields as well as opportunities to continue an educational path leading to a bachelor's degree and even more opportunities, such as project management.

Earnings

According to the *Occupational Outlook Handbook* (U.S. DOL BLS, 2019), the

median annual wage for web developers in May 2018 was \$69,430, with the highest 10 percent earning more than \$124,480.

Job Outlook

Employment for web developers is projected by the Bureau of Labor Statistics (2019) to grow an impressive 15 percent from 2016 to 2026. Our increased use of mobile devices as well as our love of online shopping will help contribute to this growth, with ecommerce booming and more companies adding online options. The World Organization of Webmasters (2019) noted that the development of new software, such as web authoring tools, will increase the demand for web professionals — and, as the number of webpages continues to grow, so will the need for web professionals.

EXPLORE MORE

For more information about the career of Web developer and the education and training it requires, here are some resources to explore.

World Organization of Webmasters http://webprofessionals.org

Association for Computing Machinery **www.acm.org**

CIW

https://www.ciwcertified.com

CompTIA Association of Information Technology Professionals https://www.aitp.org

Computing Research Association https://cra.org

IEEE Computer Society https://www.computer.org

National Center for Women & Information Technology https://www.ncwit.org

Interface Design for Interactive Applications; Web Authoring: HTML5 and CSS3; Adobe Photoshop: Digital Art; Web Authoring: Applications; and Personal Branding, which stresses the importance of professional development and personal branding, and walks students through the design process to develop appropriate branding elements for collateral and promotional materials. After successful completion of the certificate program, students should be prepared to analyze a client's needs, design a website concept, and execute the creation of a final product. They should also be able to effectively use developmental software and digital image manipulation to enhance the presentation of a webpage.

MHCC has more than 100 transfer/ articulation agreements with colleges and universities for students who choose to continue their education. For the CIS program, these include Oregon Tech, Southern Oregon University and Western Governor's University, with both Oregon Tech and Southern Oregon University offering options for Web Management/Web Master.

According to the World Organization of Webmasters (2019), web professionals have one of the top jobs in America based on income, outlook, security, stress, environment and physical demands. That is a solid foundation of assets upon which to build a career, and MHCC's CIS program offers students the solid foundation of education they will need for success in that career. Career and technical education will also provide a solid foundation for the Mt. Hood community, which continues to benefit from the academic and technical skills training provided by the college in high-demand fields such as computer information systems and web development.

For more information about Mt. Hood Community College and its computer information systems AAS degree and its web developer/digital designer certificate programs, visit **www.mhcc.edu**.



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INVESTING FOR SUCCESS: CHOOSING DIGITAL FABRICATION SOLUTIONS THAT OPTIMIZE LEARNING

CAREER AND TECHNICAL EDUCATION (CTE), AN IMPORTANT COMPONENT OF

U.S. education for more than a century, has undergone both a renaissance and a resurgence in the past decade. According to research by the Brookings Institute, "In 2015 alone, 39 states instituted 125 new laws, policies or regulations relating to CTE, many of which increased state funding for such programs" (Jacob, 2017).

While both students and society as a whole benefit from well-funded CTE programs, carefully choosing where to invest those funds is critical. When selecting digital fabrication equipment, many successful programs around the country are opting to invest in devices from manufacturers that offer the support and software needed to help bring both students and staff up to speed quickly.

Investing for Success

Roland DGA has devised a well-supported suite of digital fabrication instruments, including eco-solvent printers, vinyl cutters, 3D milling machines and UV flatbed printers. In addition, Roland offers easy-to-use software and proprietary project-based learning (PBL) resources. Whether purchased all at once or over time, these devices enable student learning with simple-touse equipment and step-by-step tutorials for quick acquisition of real-world skills.

Blue Ridge High School, in Lakeside, Arizona, developed a unique partnership between its district and the University of Arizona Cooperative Extension 4-H Program to provide a digital fabrication lab and makerspace for students. Kevin Woolridge, a physics teacher at Blue Ridge High School and a volunteer 4-H leader, proposed the collaboration.

Their facility — outfitted with Roland's VersaUV LEF UV flatbed printer, Versa-CAMM SP-300i wide-format digital printer/cutter, CAMM-1 GS-24 desktop cutter, and MDX-40A milling machine — is available to K–12 students in the district and to 4-H members in Navajo County and across the state.

At Blue Ridge, teachers use Roland's PBL tutorials to help train students on the equipment as they fabricate license plates, decorative tiles and wooden yoyos. "The learning modules were really important to us," said Woolridge. "These ready-to-teach tutorials make it so we don't have to reinvent the wheel on projects, and they help ensure that we're providing our students with the best possible instruction on how to use our digital devices."

Instructing Instructors

The step-by-step tutorials Roland offers also reduce time-consuming lesson preparation and planning for instructors. With these tutorials, students can work at their own pace without strict supervision, freeing up instructors to spend time with each student.

Paul W. Camick, Ed.D., coordinator of career technical and agricultural educa-

tion for the DeKalb County School District in Georgia, has implemented a complete suite of digital fabrication technology at all of the middle schools and high schools in his district. DeKalb County has focused on organizing its STEM efforts around projects in several different disciplines, including engineering, graphic arts and marketing programs. 80008

"The engineering design process is a seminal part of any STEM education program. It sets that stage for the skills students need to be competitive in the global workforce. As part of the design process, students must research, design, prototype, test, optimize, and communicate their designs," said Camick.

Enabling Student Learning

Designed to be easy to understand, Roland's hands-on, step-by-step lessons allow students to learn more, achieve more, and build their confidence in design, engineering and graphics production. In addition, PBL is web-based, making it easily accessible. Students can use the series of device-specific tutorials to become familiar with the devices' hardware and software, and the tutorials cover key safety and machine maintenance topics as well.

By allowing students to self-learn the software, machines and projects, Roland's PBL tutorials promote intuitive learning. Students can achieve fast results and an immediate sense of accomplishment.

INDUSTRY CONNECT



Setting a Foundation for the Future

In addition to advancing STEM objectives, digital fabrication processes can serve as the basis for school-based enterprises, incorporating additional value for students. Through running a school-based store or print shop, students are exposed to a wide range of skills and activities including sales, marketing, management, accounting, manufacturing and distribution.

These enterprises can also be a source of additional funding for schools, contributing resources for digital fabrication and STEM programs, or for the overall operational budget of the school.

"In all our CTE programs there is a school-based enterprise component.

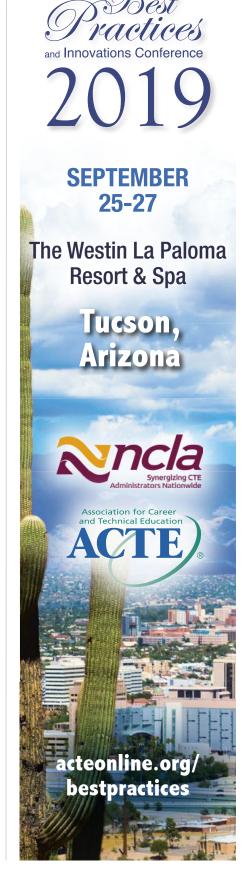
Teachers and students use the machines to create banners, yard signs, buttons, trophies, awards, T-shirts and spirit wear. We have graphics programs that create products districtwide as well," said Camick.

Investing in a well-supported suite of digital fabrication instruments ensures endless possibilities for creativity, learning and furthering students' future career skills.

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Jacob, B.A. (2017). What we know about career and technical education in high school. Retrieved from https://www. brookings.edu/research/what-weknow-about-career-and-technical-education-in-high-school/.





EVENTS CALENDAR



SEPT. 25–27 THE WESTIN LA PALOMA RESORT & SPA TUCSON, ARIZONA acteonline.org/bestpractices



OCT. 2-3

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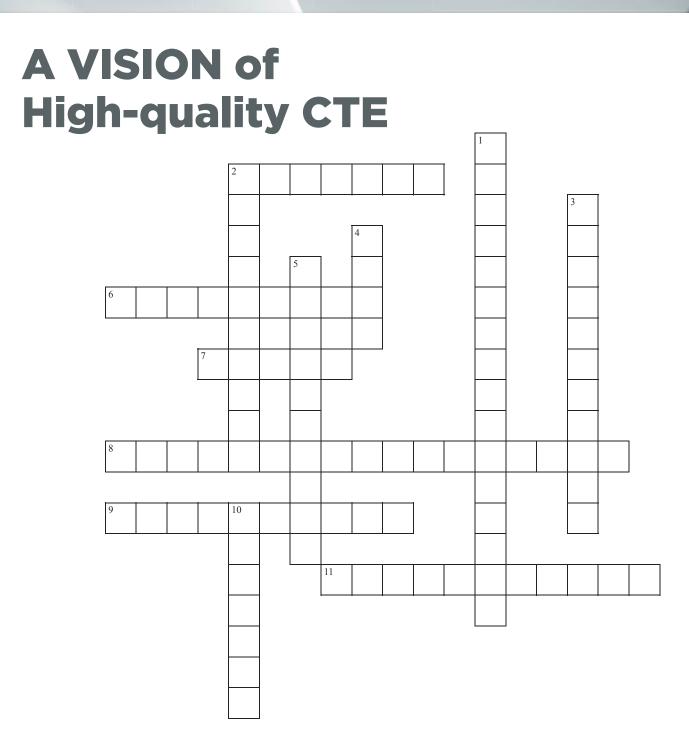
Dec. 4–7 Anaheim Convention Center Anaheim, California careertechvision.com



CRYSTAL GATEWAY MARRIOTT (WITH DEDICATED TIME ON CAPITOL HILL)

> ARLINGTON, VIRGINIA acteonline.org/nps





Across

2. California city that will host ACTE's CareerTech VISION 2019

6. First name of Hughes, Ph.D., a principal researcher with the American Institutes for Research

7. Career and Technical Education Research Network

8. Element No. 3 in ACTE's *Quality CTE Program of Study Framework*

9. Criminal activities carried out by means of computers or the internet

11. The E in STEM

Down

1. Provided with insufficient or inadequate representation

2. A person who is learning a trade from a skilled employer, having agreed to work for a fixed period

3. Suburban Philadelphia area community college system experiencing success in industrial maintenance education

4. He/she pronoun alternative

5. "We Are Class _____"

10. Last name of ACTE's CareerTech VISION opening general session speaker, a NASA veteran and astronaut

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- Career Pavilion providing essential resources on several CTE career pathways
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- The ACTE Excellence Awards Gala, a heartwarming gathering of passionate CTE professionals and supporters
- STEM is CTE Symposium addressing access and diversity issues on Wednesday, December 4

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