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2026

How Schools Can Elevate Their CTE Offerings

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EDITOR'S NOTE

Career and Technical Education (CTE) is rapidly evolving to **meet the demands of a high-tech economy**. As employers call for **AI literacy, advanced technical skills, and real-world experience**, schools are expanding CTE programs in areas such as artificial intelligence, semiconductors, cybersecurity, and health sciences. These modern pathways, shaped by industry partnerships and local workforce needs, are drawing strong student interest by offering **clear, high-wage career connections** and hands-on learning that goes far beyond traditional models. Sustaining this growth will require addressing key challenges, including **funding, program quality, and the shortage of qualified CTE instructors**. Educators point to a notable gap: **careers in education are often overlooked** within CTE, despite urgent workforce needs. Together, these articles underscore a clear message—**CTE is no longer optional**; it is a critical strategy for preparing students for the future of work, and its success depends on **smart investment, strong staffing, and continued innovation**.

Vanessa Solis/Education Week via Canva

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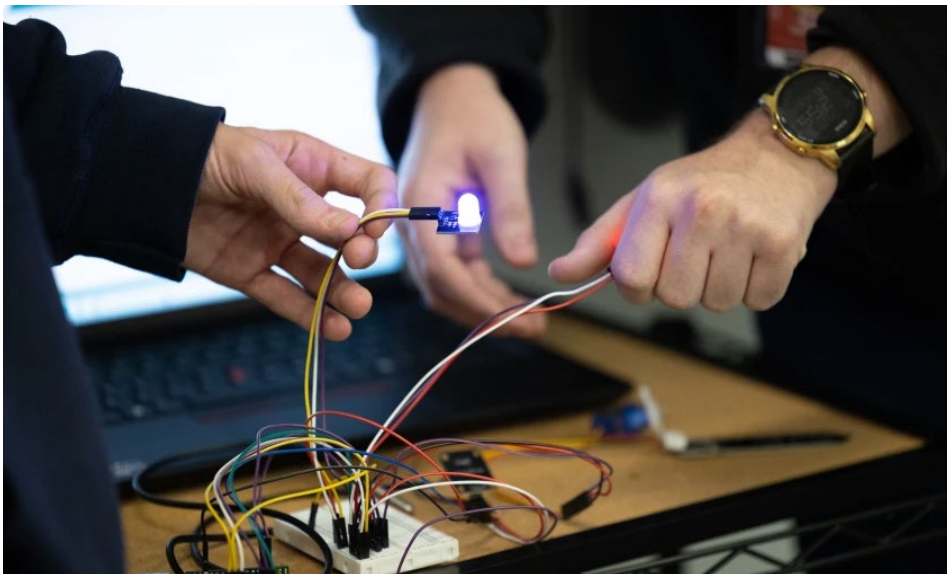
Published November 17, 2025

Businesses Want Employees With AI Skills. Are K-12 CTE Programs Keeping Up?

By Lauraine Langreo



Thomas Hammond for Education Week

Students do presentations about their AI-powered projects that are designed to help boost agricultural production during Calla Bartschi's Introduction to AI class at Riverside High School in Greer, S.C. South Carolina is emphasizing the development of AI skills that are relevant for the careers students want to pursue in the future.

The students in Calla Bartschi's Introduction to AI class at Riverside High School in Greer, S.C., are gearing up to present a project showing how artificial intelligence technologies can be used in the agriculture industry.

The students walk around the classroom to collect soil data using Arduino Uno microcontrollers and sensors, which are basically small computers. Later, they'll analyze the data and create a prototype of an automated system that would help stabilize farm conditions amid environmental challenges and improve crop growth.

Earlier in the school year, the students learned about how AI is being used in the entertainment and health care industries. And later in the semester, they'll learn about how AI is used in manufacturing and sports analytics.

It's been "really eye-opening for the students to see something that they interact with a lot but maybe didn't realize how much AI already existed [in it]," said Bartschi, whose school is part of the Greenville County school district.

The class is a first-year pilot of a new K-12 career and technical education pathway focused on AI that South Carolina is developing. It's an example of how schools and districts are starting to incorporate the use of AI into CTE programs to prepare kids to think about the technology in the context of their future careers.

Nearly one-third of CTE educators say they expect their district or school to introduce CTE offerings in the fields of digital technology, information technology, AI, and cybersecurity, according to a nationally representative survey of 472 CTE teachers and administrators conducted by the EdWeek Research Center in the fall.

Artificial intelligence and its use are not new. A lot of the tools we interact with daily—navigation apps, facial recognition, social media, voice assistants, search engines, and smartwatches—run on AI. And many industries are already using AI one way or another.

The entrance of the generative AI tool ChatGPT in 2022 reignited discussions about how the fast-evolving technology could reshape the way we work and how students learn.

Educators have been considering what and how much of a role AI should play in student learning, especially as AI advocates say today's students need to learn how to use it effectively to be successful in future jobs.

How South Carolina is preparing AI-ready students

The AI CTE pathway that South Carolina started developing in 2022 in partnership with the Southern Regional Education Board prepares students for the workforce by teaching them about industry-specific use cases and providing them with AI skills, including how to train AI, said Ivy Coburn, the division director of education and workforce for the SREB. The SREB is a nonprofit organization that works to improve education in its 16 member states.

"We're not going to just, overnight, completely change a CTE course or program to fully be all AI," Coburn said. "What we're doing is building units around the use case so that students are learning about AI while they're understanding how it's used in that industry."

The pathway will have four units that students are expected to take over four years. The first unit is the introduction, where students explore basic AI concepts while building and designing AI solutions. It culminates with students taking a test to earn a Microsoft Azure AI Fundamentals certification.

The curriculum development team is still in the process of developing the rest of the units, Coburn said, but the idea is for students to dive deeper into AI applications for years 2 and 3, and then year 4 will be for an internship and a capstone research project.

"Initially, students expected the course to be, 'how do I use AI and how do I take advantage of ChatGPT?'" Bartschi said. "It's really been more about, what more is there to AI and then eventually how do we build it? How do we train it? What does it do well? What does it do poorly?

"They've really enjoyed it and really engaged with all the different things we've been going through," she added.

CTE programs should focus on skills and

not technology when thinking about how to incorporate AI into their curricula, said Coburn. Those skills include: adaptability, collaboration, communication, creativity, critical thinking, leadership, and problem-solving.

Core academics and career-field knowledge will also continue to be important, she added.

"Trying to make sure that the AI solution matches the program and the learning outcomes of that program would be critical," Coburn said.

Incorporating AI in CTE programs is still in early stages

A majority of schools and districts, however, are still in the early stages of thinking about how AI should be integrated into CTE programs, according to experts.

"We're starting to jot down all the spaces where we see AI being used across the CTE programs," said Angela Mike, the executive director of CTE for the Pittsburgh district.

Much of the equipment available in Pittsburgh's CTE programs already has AI components in it, Mike said. So she and her staff are examining how CTE teachers are already using those tools and how they can add AI-related lessons to their curricula.

In some cases, individual teachers are starting to incorporate AI tools and discussions about them into their lesson plans.

In Illinois' Township High School District 214 outside Chicago, computer science teacher Bob Brown has started teaching students how to prompt AI in a way that helps them deepen their understanding of a complex topic or brainstorm solutions to a coding problem, instead of just prompting an AI tool to do the work for them.

For instance, students are learning how to program buttons in a mobile app. They can use AI to ask for explanations, such as: How do I get an integer from a text field? Then, they follow the steps it tells them, Brown said.

"That's just as valid as hearing a teacher mention it. That's just as valid as watching a YouTube video," he said.

Some teachers are hearing from their industry partners about how AI is being used in the real world and what skills they want from students moving into those industries.

For instance, Erika Shiota-Montandon, the automation/robotics teacher for the Greenville district in South Carolina, shared that a student mentor who works at a nearby car manufacturing plant has talked to her students about the AI-powered robots that work alongside people and assist with production and logistics.

Other industry partners that might not be using AI yet are hoping to recruit graduates who have developed AI skills in school.

Jamie Whitlock, Greenville's CTE academic specialist, said some industry partners are "looking at the kids and younger people to be able to show them and tell them how to leverage [AI technology]."

One big challenge, Mike, the CTE director for the Pittsburgh district, said, is that AI technology is changing so quickly and schools are struggling to catch up.

Many districts, like Pittsburgh, are still in the process of creating AI-related policies or guidelines. An EdWeek Research Center survey conducted in the fall found that 27% of teachers, principals, and district leaders said their school/district doesn't have a policy on the use of generative AI.

"The jobs are changing so quickly that everybody has to get their head wrapped around it," Mike said. "We have to be willing to shift with it, so that we're preparing our students, so that they can move on into the jobs of the future that aren't even here yet." ■

Additional Resource
View this article's charts

3 WAYS TO HIGHLIGHT CAREER PATHS to K-8 Students

By: Tina Leslie, Career and Technical Education Coordinator

When I began my career 16 years ago, I taught a course to middle school students called Career Research and Decision Making. This course allowed students to explore careers, take surveys to understand what interested them, and plan for their futures. One of my go-to questions during my initial calls with students was, "What do you want to be when you grow up?"

The answers I received were often predictable: veterinarian, doctor, professional athlete, singer, or, increasingly popular today, influencer. These careers share one thing - they are familiar to students. Their reasoning was equally straightforward: "I love animals," "I love helping people," or "I enjoy playing basketball." While these are great career choices, I realized I was asking the wrong question.

Instead of asking, "What do you want to be when you grow up?" I should have asked:

- What problems do you want to solve?
- What are you passionate about?
- What are your strengths, and how can they translate into a career?

By shifting the focus, we can inspire students to think beyond the obvious and discover a broader range of career possibilities.

Introducing Careers to Younger Students

1. Start Early with Elementary Students

In elementary school, students should understand what a career is and why people work. Educators can help them identify their strengths and interests through simple, relatable activities like assigning "classroom jobs" or household responsibilities. For example, if a child dreams of being a veterinarian, they can take responsibility for feeding and caring for a family pet.

Expose them to different careers through:

- **Guest speakers** and **field trips**.
- **Career fairs**, even those designed for older students.
- **Community engagement opportunities** to meet professionals in various fields.

The goal is to help students recognize their skills, interests, and potential career paths in a fun and exploratory way.

2. Transitioning to Middle School

As students progress to middle school, educators can have them:

- Take interest inventory exams that assess their strengths and interests to help guide decisions about education and careers.
- Research career clusters, which help organize CTE related curriculum, programs, activities, and instruction for schools and districts. They also represent career pathways to help students discover what career or major in college they're most interested in.
- Set long-term goals and explore high school and post-secondary options.

This is also a great time to help them understand how they learn best. For instance, a kinesthetic learner might thrive in careers requiring physical activity or hands-on work. Focus on building soft skills such as teamwork, communication, goal setting, and adaptability, which are qualities that employers value.

3 Ways to Highlight Career Paths to K-8 Students, continued

3. Preparing High School Students for the Future

By starting career exploration early, students will gain the preparation and confidence to make informed decisions. This "fail fast" approach allows them to explore a wide range of careers and rule out those that don't align with their interests or strengths. For example, a student who dreams of becoming a nurse might discover through a guest speaker or field trip that they are uncomfortable around blood. Learning this early can save time and effort later.

By the time students reach high school, they should have a clear plan that aligns with their goals. This might include:

- Selecting relevant courses, certifications, and electives.
- Joining clubs and extracurricular activities.
- Pursuing internships, volunteer opportunities, or part-time jobs related to their interests.

How FlexPoint Supports Career Exploration

It is our priority to show and highlight diverse career paths to students from an early age. Our elementary digital courses incorporate:

- **Dramatic play,** books, field trips, and guest speakers.
- A **holistic curriculum** that integrates career and technical education through creative activities, such as using art to teach science or math games set to music.
- Emphasis on **soft skills** like communication, leadership, and critical thinking.
- A focus on **growth mindset** and grit, encouraging students to learn from mistakes and embrace the power of "yet."

In our Elementary Art 5 course, students explore careers ranging from a web designer and architect to an entertainer, demonstrating how art can shape diverse futures. By middle school, students dive into career clusters, interest inventories, and research projects. High school students build on this foundation with career and technical student organizations, career clusters, and industry certifications.

Inspiring the Next Generation

Every student will have a job someday, but no two paths are the same. By shifting the focus from, "What do you want to be when you grow up?" to "What problems do you want to solve?" educators can encourage students to connect their passions and strengths with meaningful career opportunities. Together, we can prepare them to enter the workforce with confidence, purpose, and the skills needed to thrive.

Learn more about our PreKindergarten-12th grade online courses, including the Career and Technical Education courses we offer, at FlexPointEducation.com.

About the Author: Tina Leslie is the Career and Technical Education (CTE) Coordinator for FlexPoint, who has more than 20 years of experience as a teacher and curriculum specialist. Her deep passion for CTE drives her mission to inspire students to discover their strengths, explore diverse career paths, and prepare for successful futures.

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Wesley Hitt for Education Week

Instructor Wendy Broughton, seated at left, works with students in the health sciences track of Bentonville public schools' Ignite program in Bentonville, Ark. The program—which integrates lessons about AI into its curriculum—offers career-pathway training for high school juniors and seniors in the district.

Published November 17, 2025

'What Are You Doing on AI?': How This District Added It to Career Education

By Alyson Klein

Developing an app to help expectant mothers with gestational diabetes find meals that fit their dietary restrictions and family budget. Watching doctors diagnose polyps with the latest artificial intelligence technology. Hearing from working lawyers about how ChatGPT and other large language models are complicating legal work.

It's all part of typical coursework for juniors and seniors participating in Ignite, a unique career-pathway program offered in the Bentonville public schools in Arkansas.

The program, which has been around for about a decade, offers students a smorgasbord of career-connected experiences. Classes are linked to fields they are interested in and often led by teachers who worked in those industries before becoming educators. Students receive work-based learning experiences throughout, including guest speakers who work in professions central to their areas of interest, mentors, and internships.

Ignite is a competitive program for Bentonville's juniors and seniors. About 1,000 students—or roughly half the district's 11th and 12th graders—apply for 600 available slots in one of 10 career "strands." Each focuses on a different industry, such as technology, health care, digital media, education, or global business.

After a new version of ChatGPT was released publicly in late 2022, the program has added an AI twist, helping students understand how the technology is transforming the careers many hope to enter after high school or college.

"One of our core values at Ignite is to be responsive to industry needs. And our industry partners [are asking], 'What are you doing on AI?'" said Jessica Imel, the former senior manager for finance and strategy at Walmart who now runs the Ignite program. Imel said Walmart, which is headquartered in Bentonville, and other Ignite workforce partners such as Arvest Bank, Mercy Hospital, Toshiba, and the Benton County Sheriff's office have told the district, "'When we're looking at hiring talent, they need to have some AI skills.'"

Incorporating AI into the curriculum has required extensive teacher professional development, consultation with the district's workforce partners, and creativity, Imel said. And it looks different in each of the different career strands.

Nearly two-thirds—60 percent—of 472 educators surveyed by the Education Week Research Center this fall said their district now offers a career pathway in technology, cybersecurity, or AI.

It is unclear, however, just how many districts incorporate AI across a broad swath of career pathways the way Bentonville does.

Generative AI is so new that there's no obvious road map for bringing lessons on how the technology works and the ethics of using it into career and technical education, or CTE, experts say.

But Bentonville's approach looks promising, said Kyle Hartung, a senior advisor at All4Ed, a research and advocacy organization.

The district appears to be "rooting [AI literacy and instruction] in the context of occupational identity development" in a field a student is interested in, said Hartung, who based his comments on a reporter's description of Bentonville's work.

Hartung said that means students are likely asking questions such as: "How do people use the tools of the trade? How does it reflect the core work in their industry? And what are the questions that industry is asking about how they might use technology differently?

"That feels really important and a good source of inquiry for young people as they explore the world of work more deeply."

Bentonville may be a national leader in putting AI literacy and instruction hand in hand with career education. But Imel still feels the district is behind the technological curve, given how fast its workforce partners are moving to expand their use of AI.

"Given what their demands are from young professionals, it's like we are constantly playing catch up to make sure our curriculum is responsive and relevant to what they're doing," Imel said.

Here's a look at how Bentonville is embedding AI across a broad range of fields.

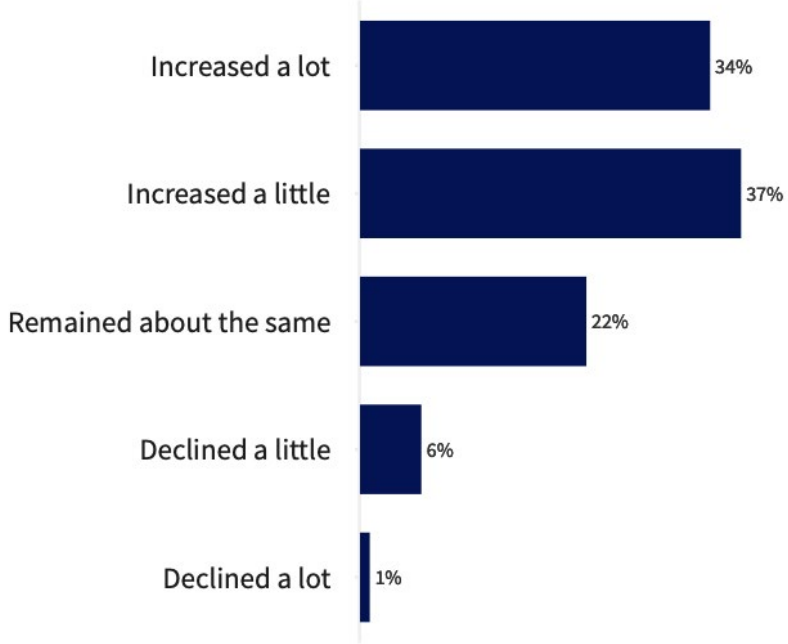
AI use is now a critical component of the graphic design curriculum

AI design tools weren't in the picture back when Jennifer Russell worked as a graphic designer for Walmart and other businesses.

Now, as an instructor in the Ignite program's digital media pathway, she's mastering the technology alongside her students.

She said she told her students at the beginning of this school year, "'I'm not quite sure

In the past five years, our students' level of interest in CTE has:



NOTE: Results show responses from teachers, school leaders, and district leaders.

DATA SOURCE: EdWeek Research Center nationally representative September-October 2025 survey of 114 district leaders with Career and Technical Education (CTE) responsibilities, 144 school leaders in a school offering CTE, 113 educators with other CTE connections, and 101 CTE teachers.

who's going to learn more, me or you, but we're going to learn together and we're going to figure it out one day at a time.'"

Recently, Russell challenged students to create eye-catching images using random objects she found around her home—an assignment that harkened back to her Walmart days when she would have to create enticing graphics for specific products. She gave them the option of enhancing photographs with AI tools.

Russell was particularly struck with a graphic created by A.J. LeFever, a senior, of a toy robot appearing to prepare to hike a distant mountain. A.J. used AI tools to sub out the original background in his photo—ordinary woods—for the mountain range.

A.J. and his classmates have also learned about the ethics of using AI to revise a photo.

For instance, it would not violate industry standards to edit certain aspects of a portrait, such as "bad acne spots, fly-away hairs that [the subject] definitely wouldn't want on their headshots," said A.J., who is considering a career in graphic design. But it would be a bridge too far to "completely change hair color" or facial features, he said.

In today's world, Russell isn't sure how anyone would be able to do the kind of corporate graphic design she used to do without the help of AI.

"It's just massive, the amount of content that's needed for social media and the web. It just feels like it just never ends," she said. "I don't know that you could humanly possibly pump out as much as needed. So, AI is going to be a really good tool in helping with that workload."

How AI helped students introduce a new product to Walmart customers

Could Walmart executives envision their customers chowing down on fried okra or cauliflower pizza bagels as they watch Sunday night football?

Four students in Ignite's global business and public policy strands set out to tackle that question, part of a broader assignment for a business law class to create a new product for the retail giant and pitch it to a group of Walmart's professional buyers.

The team's vision: frozen snacks branded with the ESPN logo and marketed to sports fans looking for something healthy—or at least healthy-adjacent—to snack on during a game.

Though students brainstormed the actual product idea themselves, they used AI for some research and even production. For instance, one student asked ChatGPT for help figuring out what kind of features—including a complicated universal product code—that need to be included on packaging for Walmart products.

When the business executive who mentors that group suggested that they include pictures of real people using their products on a mock website, the teens also turned to AI. They took a picture of the box the group designed and asked Google's Gemini, a large language model, to create an image of a family eating wings as they watch a game, with one member holding up the box.

Students in the public policy pathway also hear from both their teachers and professionals about how AI tools are already impacting legal work. For instance, AI tools are expected to replace a lot of the rote writing and research that paralegals do, freeing up time for tasks that involve more critical thinking.

Working lawyers have also cautioned students against relying too much on AI tools like ChatGPT for legal writing and research.

Students hear that "you have to be really careful with AI in this particular space, because [the tech] will make up case law," said Aubrey Patterson, who teaches in the Ignite public policy pathway and is a member of the Bentonville City Council.

Using AI tools to help tackle some of the biggest challenges in Arkansas' health-care system

Students in Ignite's health-care pathway have teamed up with peers in the technology strand to come up with digital solutions for some of the most persistent public health problems facing their largely rural state.

For instance: After extensive interviews with obstetricians who shared that women in remote areas often lack access to nutrition counseling, health-care students used AI tools

to create a meal-planning app for expectant mothers with gestational diabetes. The app works with blood sugar monitoring technology and gives patients a customized shopping list, based on their budget, family size, and food preferences. Another group of students created a digital doula platform for pregnant women that offers simple answers to common questions and connects patients with more complex queries to health-care professionals.

In both cases, students had to consider the drawbacks of artificial intelligence, such as its tendency to "hallucinate" or share false information, and find workarounds for those problems. For instance, the digital doula app includes disclaimers about the technology's lack of reliability and points users to resources where they can chat with professional doulas, who provide support to women during pregnancy and labor.

"AI is not perfect, but it is there to help and not there to replace that telehealth" with real medical professionals, said Hutson Daniel, a senior.

Students have seen firsthand during their internships how AI is transforming the medical field.

One student learned how radiologists use AI to interpret x-rays, including using the technology to flag whether a patient has an unusually high amount of calcium around their heart, making them more prone to heart attacks.

Another student, Kilee Rowe, a senior, has watched medical professionals use a tool called GI genius to figure out if a patient has polyps, a small growth found in certain organs. Though the technology can find the polyps, it can't tell whether a patient's gastrointestinal condition like Crohn's disease or ulcerative colitis, could complicate polyp removal. Doctors have to make that call themselves, Kilee learned.

AI is "assisting doctors, not replacing them," Katie said. "I have seen doctors and nurses use it properly and use it to their advantage."

Students design app to help kids who have trouble communicating feelings

Sanjay Shreeyans Javangulaa wanted to help his cousin in India who is on the autism spectrum and sometimes has trouble reading other people's emotions or navigating social situations.

"He would laugh when it was a sad moment for everybody," Sanjay said. "His facial expressions really made it harder for him to make friends."

So, Sanjay and his friend Soham Shekhar—both seniors in Ignite's technology pathway—created Pico, an animated panda bear in an app designed to help children ages 5 to 12 with austism spectrum disorder and other learning and thinking differences—navigate social situations.

The app includes a game called "emotion detective" in which kids identify a face displaying a particular feeling, say, happiness or sadness. They'll have a discussion with Pico about a time they might have experienced that emotion. Users are then given a chance to mirror the emotion themselves, with feedback from Pico via a video camera.

The app can also help children practice social situations by instructing Pico on how to order a meal in a restaurant or handle being left out at recess. And kids can communicate directly with Pico about their feelings. For instance, if a child tells Pico they are feeling down, the character will respond with something like, "My panda heart feels that with you. It sounds like you had a really tough morning and felt very frustrated."

Learning about emotions through an app might help kids like Sanjay's cousin, the students believe. Unlike a person, an app is "super nonjudgemental," Soham said. "It helps kids feel relaxed and to be able to talk to and work through different problems."

In their research, the students read about AI's tendency to hallucinate or go off script. They worried that could be harmful for the kids they were trying to help. That's part of the reason the students decided their main character should be a cuddly panda.

"We decided to go with a nonhuman to make it more cartoony and to make the kids feel like it's just a tool and not like an actual replacement to real human interaction," Soham said.

The students' teacher, Padmasruthy Kumari, who holds a master's degree in technology, also warns her students not to use AI as a crutch.

"I always want their creativity," Kumari said. "I don't want the shortcut answer."

To be sure, many of the students realize that the AI tools that seem cutting edge today will likely be obsolete by the time they join the workforce. But they believe simply getting the experience of puzzling through a new technology will serve them well no matter how AI develops.

"It doesn't matter how vastly the technology changes," said Soham. "It's always going to be about solving different problems and being able to do that in a logical manner. Even if we get better models or different algorithms and more code bases, that problem-solving skill still would be very much essential." ■

Additional Resource
View this article's charts

Wesley Hitt for Education Week

Students in Bentonville public schools' Ignite program work on projects during class in Bentonville, Ark. The program offers career-pathway training for juniors and seniors in the district.

Published November 20, 2025

How Schools' CTE Offerings Are Going High Tech

By Arianna Prothero

Technology is playing a much bigger role in school districts' career and technical education programs, a shift that experts say started during the pandemic and is continuing as the use of artificial intelligence expands across all sectors of society.

Over the past five years, the most popular category for new CTE programs in schools was for careers in digital technology, IT, AI, and cybersecurity, according to a survey of teachers, principals, and district leaders connected to career and technical education. The survey found that 28 percent of educators said their school or district had started these kinds of technology programs sometime within the past five years.

Experts say the creation of those new programs is driven largely by technological advances, such as the rapid development and adoption of AI-powered technologies, the increasing frequency and sophistication of cyberattacks, and the expanding use of digital technologies in the workplace.

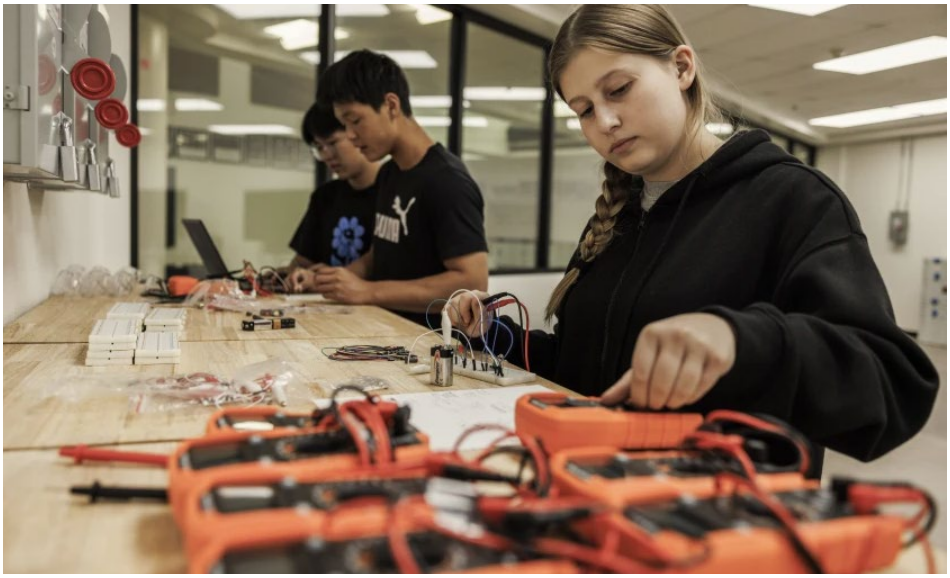
In addition to new offerings in technology-related fields, other career areas where new programs have taken root over the past five years include education; arts, entertainment, and design; and construction, the survey found.

As it is, the three most commonly offered CTE pathways in schools and districts are digital technology, IT, AI, and cybersecurity; construction, including architecture and civil engineering; and hospitality, including events, tourism, and culinary arts, according to the EdWeek Research Center survey.

In addition to rising interest in tech-focused CTE programming, all career and technical education programming is becoming more technology-oriented, said Michael Connet, the associate deputy executive director for outreach and partnerships for the Association for Career and Technical Education. He spoke with Education Week recently as part of a special report on AI in CTE.

"By virtue of the hands-on, experiential nature of CTE instruction, there hasn't been historically a major role for educational technology in CTE classrooms," he said. "That all changed because of the pandemic when teachers had to go remote and use the learning-management system for communication and virtual learning. Now that we're back in person fully and doing things that are hands-on, ed tech has stayed with them." ■

Additional Resource
View this article's charts



Adriana Zehbrauskas for Education Week

Alina Kiselev, 17, works on a Wheatstone bridge circuit during a class on semiconductor manufacturing at Hamilton High School in Chandler, Ariz. The school launched a two-year semiconductor program this academic year to help meet the demand for trained employees in sector.

Published December 04, 2025

In 'Silicon Desert,' a School Prepares Students to Join the Semiconductor Boom

By Elizabeth Heubeck

Chandler, Ariz.—

It's a typical balmy fall afternoon here, as about 15 high school students file into class. Most wear the de-facto teen uniform of sweatshirts, comfortable pants, and sneakers and, in elevated voices, they joke among themselves as they make their way to their seats at group tables.

The periphery of the otherwise typical-looking classroom contains electrical devices and thin, unassuming wafer-like objects that can form the building blocks of semiconductors, which power just about all our modern-day electronic devices—from smartphones to satellites.

While these high schoolers may act and look like typical teens, what they're learning is not typically found in the traditional high school curriculum. Studying the inner-workings of semiconductors is generally reserved for college students studying STEM-related disciplines or employees in the industry receiving hands-on training.

Yet when Hamilton High School began offering a cutting-edge career and technical education (CTE) semiconductor program this school year, students like senior Alina Kiselev wanted in on it. She doesn't have enough time to complete the two-year, 18-credit program. But she enrolled in the introductory course anyway, "just for fun."

A self-described lover of all things physics and electronics, Alina's natural curiosity piqued her interest in learning about semiconductors. She also admits to wanting to know more about the conversations she's been overhearing from the back seat of the family car all these years when her parents, both technicians at Intel, drove her to school on their way to work.

"I used to think [the semiconductor industry] was all about the people in the bunny suits working with the wafers, but it's so much more than that," Alina said

Bunny suits? Wafers? Just months into the course, Alina and her classmates toss around these and other industry-associated terms as though they're typical of teen vernacular. (Bunny suits refer to protective garments worn by workers in semiconductor hubs. Wafers are disc-like silicon substances that make up the building blocks that eventually power electronics.)

That's intentional, as building industry vocabulary is an essential piece to the CTE program's overarching goal of exposing students to the booming semiconductor industry's manufacturing process, from the principles to the processes and the tools that underpin it.

This exposure can't come soon enough for students in a state that has emerged as a leader in the semiconductor industry. In the last five years, Arizona has secured more than $210 billion in semiconductor-related investments, some of it tied to the CHIPS Act of 2022.

That federal law allocated approximately $50 billion over five years to drive the United States' semiconductor manufacturing industry and reverse a decades-long decline in the nation's global presence in the sector. In 1990, 37% of all semiconductor manufacturing occurred in the U.S.; today, it's closer to 12%.

The Chandler Unified school system's creation of the program is "absolutely appropriate now, given the scale of investment and anticipated workforce needs," said Steven Zylstra, CEO and president of the Arizona Technical Council, a trade association for the state's science and technology companies. "The semiconductor industry has matured to the point that workforce shortages are becoming a bottleneck."

But the program—funded through state and federal grants—required a lot of groundwork from the Chandler Unified school district. From tapping local higher education experts to drumming up support from local and global companies to raising awareness and interest among staff, students, and parents, each step in the process started with efforts initiated from inside the district.

How Chandler went from a sleepy agrarian town to the 'Silicon Desert'

A confluence of factors aligned to transform Chandler from a sleepy agrarian outpost of Phoenix to what some have nicknamed "Silicon Desert." Business experts point to the suburb's vast amount of land, close access to an international airport, a business-friendly environment (based on its tax structure), and higher education institutions like University of Arizona and Arizona State University dedicated to innovative research in tech-heavy industries.

In 1980, Intel opened its first manufacturing plant in Chandler. Fast forward to 2022, when the CHIPS Act led to a $7.9 billion investment for the growth of the company's

U.S.-based semiconductor manufacturing facilities, including one in Chandler. The forthcoming semiconductor projects at four U.S. facilities are part of Intel's plan to invest more than $100 billion to expand chip production capacity and capabilities in the country, according to a company spokesperson.

TSMC Arizona, another key player in the industry, has made a $65 billion investment to fund three semiconductor fabrication plants in its nearby Phoenix location following the passage of the CHIPS Act. Overall, the state's investment in semiconductor expansions related to the federal law represents 13,000 potential jobs, according to the Arizona Commerce Authority.

Hamilton High's new program—which adds to the district's cadre of 20 other CTE programs—is the district's attempt to respond to the growing semiconductor workforce demands in its own backyard. Its goal is for the program to be relevant, universal, and flexible.

Hamilton High School, in the heart of the affluent and sprawling suburb of Chandler, serves about 3,300 students from diverse racial/ethnic backgrounds: 37% of its student body is white, 25% is Hispanic, 18% is Asian, and 9% is African American. While 39% of public school students across Arizona are eligible to receive free lunch, just 14% of students at Hamilton High are.

The school's students are also well-positioned to continue their education after high school graduation: 83% of its graduates attend a two- or four-year college, compared to a national rate of approximately 62%, and students score higher in both the math and the evidence-based reading and writing portions of the SAT than students nationally, averaging 669 versus 508 (math); and 651 versus 520 (reading and writing), respectively.

"Some of the kids [in my class] are very academic; they probably have a direct path to college," said the semiconductor instructor, Omar Muñoz, whose engineering degree preceded his nearly 30-year career in the semiconductor industry, most recently at Intel in Phoenix. The 53-year-old last year took an early retirement and pivoted to teaching; the timing worked well for him and Hamilton High.

As for Muñoz's students, he says even those who choose not to go to college but who complete the two-year semiconductor CTE program could possibly be hired immediately at a company in an entry-level manufacturing position. Plus, a partnership with Rio Salado College, a community college in neighboring city Tempe, allows Hamilton students the option to earn college credits for the coursework associated with the program.

A search for industry and academic partners reaps results

When Chandler Unified's administration in 2023 approached Janet Hartkopf, the school's emerging technology coordinator and a former cybersecurity instructor, about spearheading a new CTE program focusing on the semiconductor industry, she knew she'd be starting from scratch.

"There is nothing out there. There's no high school curriculum. The best we have right now is advanced manufacturing, and that is different," Hartkopf recalls thinking, as planning for the program was just getting started. "We wanted to be very intentional in its design. ... We wanted to make it modular, flexible, so that any district can scaffold it to what they need."

But first, she'd need to find the right experts to guide the program's development.

Hartkopf found a strong partner in the University of Arizona, where she welcomed the expertise of staff led by Liesl Folks, a professor of electrical and computer engineering and the founding director of the university's Center for Semiconductor Manufacturing.

The university was in the process of ramping up its efforts to support the semiconductor industry by establishing and strengthening industry and academic partnerships. As part of that effort, the university entered into a memorandum of understanding with the Chandler Unified school district's governing board to establish Hamilton High's program in semiconductor manufacturing.

With the University of Arizona providing research expertise and the training know-how, Hartkopf began seeking industry support for the program. "I visited over 50 companies, just in Chandler alone," Hartkopf said.

In response, she received support from 25 companies, both local and global. Arm, the largest semiconductor company in the United Kingdom, agreed to sponsor a semiconductor summer camp run jointly by University of Arizona and Chandler Unified. A U.S.-based Samsung employee shared a draft of the school's curriculum with colleagues at the company's corporate headquarters in South Korea for review.

Representatives of locally-based semiconductor companies have made classroom visits to explain what their organizations do, and the roles their employees play. Alina and her classmates have gotten to interview them about their jobs, learning about what it's like to be an engineer, a mechanic, a production associate, and a member of a manufacturer's emergency response team.

Additionally, company representatives have made guest appearances at professional development sessions to help district staff increase their knowledge of the semiconductor industry. Other companies have contributed classroom equipment such as small electronics and sanitized data samples for use during in-class projects.

Earlier in the fall, the students got a free pass to skip class and attend SEMICON West, a premier microelectronics exhibition. Normally held in technology hub San Francisco, this year it was in Phoenix. There, Alina said she met people who design and sell critical components of semiconductors to major companies like TSMC and Intel.

The industry's role is also evident in the school curriculum, which was shaped in large part by University of Arizona instructional designers.

"I am 100% confident of what we built, because we built it with industry, for industry, from the start," Hartkopf said. She added that the entire two-year curriculum, slated for completion in the spring of 2027, will evolve as the industry does.

"Technology changes so much," she said. "You cannot afford to say 'we're done.'"

Getting the word out to students and staff

As the school's curriculum started to come together, the district turned its attention to marketing the program. In partnership with the University of Arizona's Center for Semiconductor Manufacturing, it decided to launch an annual weeklong semiconductor summer camp, starting in the summer of 2024, to gauge, and hopefully pique, student interest in the subject.

The "chips and wafers" camp, for rising 9th and 10th graders, promised participants the opportunity to meet with University of Arizona semiconductor experts, tour Chandler-based semiconductor companies, and participate in hands-on activities.

It proved popular. In the camp's first year, within 36 hours of opening registration, 96 students attempted to register for 40 slots, Faulks said. Thirty-three percent of campers later enrolled in Hamilton High's semiconductor program.

Hartkopf continually works at finding ways to keep the student pipeline growing. Some of

her work involves educating the school's staff members on the industry and its merits, so they can, in turn, encourage their students to consider the program.

This involves explaining what a semiconductor wafer is and even having her adult audience simulate making them out of Play-Doh. She talks about the different careers involved in the industry, and tells them about the locally-based companies in the industry.

"They get this holistic, broad overview of what the semiconductor industry is," she said.

Schools across the country consider how to meet workforce demands

As the demand grows for trained future employees in fields related to emerging technology—such as semiconductor manufacturing, cybersecurity, aviation, or advanced manufacturing, or other burgeoning industries—more school districts across the country may be seeking out industry and educational partners to build CTE programs like the one in Hamilton High.

Already, Hartkopf has fielded calls about the program from districts as far-reaching as Wisconsin and California, and she will be attending an upcoming national CTE conference to spread the word.

Other related classes and programs have begun to crop up elsewhere. The Princeton Independent school system in Texas this year added a class in electrical engineering technology for seniors that it says will prepare graduates for employment with Texas Instruments, a large semiconductor manufacturer; it plans to expand to a two-year program in the future.

The Taylor Independent school district, also in Texas, recently launched an electronics technology program that includes but doesn't focus exclusively on the semiconductor industry. Samsung Austin Semiconductor donated $1 million to fund the program's laboratory and equipment.

Some of the momentum for supporting training programs for the semiconductor industry is occurring at the college level. The Association for Career and Technical Education identified three programs focused on the sector: in Florida, Illinois, and Arizona's Maricopa County, where Chandler is located.

Community college-based CTE programs in emerging technology areas can be more specialized, evolve faster, and and often provide students with a set of skills closer to the labor market than high schools, said Alisha Hyslop, chief policy, research, and content officer for the association. Plus, they can offer dual-enrollment credit to students in related high school-based programs.

But finding knowledgeable instructors to teach at either the high school or college level is a challenge. Pay is a big stumbling block.

"In cybersecurity, semiconductor, or other emerging tech jobs, an individual could make three or four times more than teaching," Hyslop said.

Positioning students for success

In Chandler Unified, Muñoz teaches all three sections of the semiconductor classes, working with a total of 48 students. Toward the end of his nearly 30-year career, Muñoz managed employees at Intel, a job he says isn't too different than "managing" a classroom of high school students.

He sees the benefit in introducing students early to the many facets of the semiconductor arena. "We're gonna try to expose them as much to the whole industry, so they can make better choices" when choosing a major or career path, he said.

As for Alina, the senior at Hamilton High School, she seems to have a strong grasp of her next moves after graduation.

"I want to work at Intel for a few years," she said. "I don't know if I'll stay in the semiconductor industry, but I'll definitely stay in the tech industry," which means having to know "the basic stuff that it's comprised of."

Eventually, Alina said, she figures she'll get a degree in engineering of some sort, maybe manufacturing or mechanical engineering, after being in the workforce for a few years—or possibly while in it.

Alina observes that she'll likely be the first person in her family to get a bachelor's degree. Maybe, she says, even a Ph.D.

"My parents, they're technicians. It's surprising how far they've gotten with such little education," Alina said. "It shows that experience goes a long way, right?" ■

LEVEL UP CAREER AND TECHNICAL EDUCATION to Prepare the Future Workforce

According to the U.S. Department of Education, students who focused on Career and Technical Education (CTE) courses while in high school had higher median annual earnings eight years after their expected graduation date than students who didn't. A reason for this is that CTE courses gave them the opportunity to learn valuable workplace skills like communication and time management.

So, how can school and district leaders help ever-evolving student populations graduate from high school and enter high-demand, high-wage jobs or continue with postsecondary education? **Develop a long-term strategy for CTE that allows your program to grow and adapt over time**.

To help, we've put together **three ways you can enhance CTE offerings** to ensure your decisions are driven by what employers want to see paired with what students are excited about.

Provide Students with Opportunities to Gain Employability Skills and Industry Certifications

With fewer students interested in completing a four-year degree and high-demand, high-wage job opportunities more readily available, it's important that educators help students learn the technical skills needed while also teaching them the value of employability skills.

A great place to start is the U.S. Department of Education's Employability Skills Framework, which includes three overarching skill categories for employability - applied knowledge, effective relationships, and workplace skills. The best way to ensure your students are grasping these skills is through different assignments, quizzes, and more.

CTE courses can also prepare students for **industry certifications**. They're valuable to employers because they verify a job candidate's technical skillset - giving your students a leg up when applying for jobs.

Partner with Career and Technical Student Organizations (CTSOs)

CTSOs are an integral component of curriculum and instruction, building upon employability skills and concepts through the application and engagement of students in hands-on demonstrations and real-life and/or work experiences. There are eight CTSOs, including DECA (formerly Distributive Education Clubs of America), TSA (Technology Student Association), and FFA (Future Farmers of America).

Students within these organizations have the opportunity to gain real-world job experiences, including working with their peers, creating resumes, networking, and more.

Refine and Expand Your Career and Technical Education Course Catalog

Just like the employment landscape changes, so do your students' interests, which is why it's critical to refine your CTE offerings each year. The top three questions to ask yourself every year include:

- Over the next five years, what are the top three to five occupations for your county/state?
- What employability skills are employers most looking for in the next three years?
- How has your student population changed over the past year?

Once you answer these foundational questions, you can start looking at your current CTE course offerings. For example, if you're a rural school or district and the U.S. Bureau of Labor Statistics is estimating an increase in agriculture jobs over the next five years - do you have a program of study related to agriculture? If not, it may be time to start investing in that program of study.

To help school and district leaders take their CTE program to the next level, our team developed a free guide.

Download the Free Guide at FlexPointEducation.com/CTEguide

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Published December 03, 2025

What Are the Most Popular CTE Classes and Why? We Asked Educators

By Kevin Bushweller

Career and technical education programs are on the rise and appear poised for greater expansion.

Well over half (61%) of educators report their districts have increased their CTE offerings over the past five years, according to a recent survey of teachers, principals, and district leaders by the EdWeek Research Center.

Over the next five years, three quarters of educators expect to offer more opportunities for work-based learning and internships, greater access to programs that allow students to earn industry-recognized credentials, and more opportunities for on-the-job, career-learning experiences, the survey found.

The expanding opportunities schools are offering appear to be a response to rising student demand. Enrollment in K-12 CTE programs increased 10 percent between the 2022-23 and 2023-24 school years, from 7.8 million to 8.6 million students.

"CTE, right now, is in a bit of a renaissance," said Michael Connet, the associate deputy executive director for outreach and partnerships for the Association for Career and Technical Education. "You're hearing a lot of people talk about it."

Now, Connet added, "we're more focused not just on the piece of paper or the competency that comes out, but having the skills that lead toward great employment opportunities and lifelong careers."

In an open-ended question in the EdWeek Research Center survey, educators were asked: What CTE courses/areas are most popular right now with your students and why?

Education Week combed through more than 320 of those responses and picked 35 that represent important themes or issues in career and technical education, such as a desire for hands-on learning, the ability to earn competitive salaries right out of high school, and an interest in emerging fields that are now being integrated into school district CTE programs.

Here is a look at those 35 responses, which have been edited for length and clarity:

Thomas Hammond for Education Week

Students in the health sciences track of Bentonville public schools' Ignite program practice taking blood pressure in Bentonville, Ark. The program—which integrates lessons about AI into its curriculum—offers career-pathway training for high school juniors and seniors in the district.

Higher pay and the 'cool factor' draw students toward high-tech fields

Drones and aviation are the 'hot interest' with all of our students right now. The 'cool' factor and the transferable certifications for the drone industry are probably why most students like it.
—District-level administrator—student services | Oklahoma

Cybersecurity areas due to high-paying, flexible job opportunities.
—District-level administrator—Title I/equity | North Dakota

The kids seem to really like the robotics course because they get to work with drones.
—Middle school teacher | Texas

Technology and AI because there is so much we don't know and it's growing so quickly.
—Middle school principal | State not available

Our students would like more courses in IT.
—Middle school principal | South Carolina

Our BioMedical pathway has been the most popular as our student population has a large number of medical professionals in the community.
—District-level administrator | Michigan

Aviation Maintenance Technology. Aviation is intriguing and employment opportunities are abundant in this area.
—District superintendent | Massachusetts

Students attracted to hands-on nature of construction and building trades such as welding

Welding is popular perhaps because it is hands-on and [offers] tangible results.
—District-level administrator—Career and Technical Education | New Mexico

We offer a boat-building course that receives a lot of student attention and is often full. Our district is located on the coast, with beaches and other bodies of water within easy driving distance. Students value both the practical

skills they develop and the opportunity to test their hand-made boats in real life.
—District-level administrator | Massachusetts

Auto, Design, Fabrication & Welding, Allied Health, Culinary, Construction. The trades are increasingly becoming more popular. Their perception is good pay with less time in college.
—District-level administrator—student services | Michigan

Building Trades, Machines/Welding. We live in a rural farming community—these skills transfer both to farm work and local needs for skilled labor.
—High school teacher | Michigan

Students with IEPs prefer the hands-on courses such as ag, construction, welding, and cosmetology.
—District-level administrator—special education | Georgia

Right now, pretty much all of our programs are filled to capacity. HVAC and electricity have been popular as well as cosmetology and health services.
—High school teacher | Ohio

Mechanics and automotive are among the most popular due to the relevant, hands-on experience and pathway to a high-paying career right out of high school.
—District-level administrator—Title I/equity | New Mexico

In recent years, we have seen an increase in the desire from our graduates to move directly into construction fields following graduation. These have included electrical, plumbing, and carpentry.
—District-level administrator | State not available

Construction-related fields, including carpentry, welding, electrical, and plumbing. Students want hands-on learning experiences, they are seeing there is a future for them in these fields.
—District-level administrator—Career and Technical Education | Maine

Industrial Maintenance. This is a big push for our district and it provides high-paying jobs.
—Principal | State not available

Health sciences, culinary, and cosmetology draw interest, due to immediate job opportunities

We have doubled our Gourmet Foods & Culinary Arts program by connecting to middle school students and families before they select their high school electives. As such, our teachers have collaborated with one another to share the kitchen while also completing the meal-prep, nutrition, & instructional portion of the courses. I'm happy to say that we were able to double the number of sections this year.
—High school principal | Virginia

Trades, cosmetology, and health professions because they are interested in hands-on work where they can begin earning without lengthy preparation.
—School-level employee, former charter school principal | California

Most popular are engineering, health sciences, and culinary. These programs house some of our most experienced and seasoned teachers.
—District-level administrator | State not available

Hospitality. Lots of opportunity for students to obtain employment.
—District-level administrator—Career and Technical Education | California

Health Science. We have two human health services programs, two biomedical programs, and a veterinary sciences program, all of which are regularly on a waitlist.
—District-level administrator—Career and Technical Education | Florida

Electrical and Health Science are the most popular, due to the demand in our area for electricians and health care workers.
—District-level administrator—Career and Technical Education | Pennsylvania

Culinary. They like to learn to prepare food and know that it is a skill they will always have and use.
—High school teacher | Missouri

Cosmetology. Students are interested in leaving with their state license.
—High school vice-principal | New Jersey

Agriculture careers are popular in rural areas

Agriculture because we live in the middle of tons of ranches and cotton farms.
—District-level administrator—Career and Technical Education | Texas

Agriculture—rural, agricultural community. Cybersecurity—employment prospects. Architecture and engineering—teacher popularity and student organization popularity. Carpentry/building trades—employment prospects.
—District-level administrator—Career and Technical Education | Virginia

We are a rural district, so agriculture programs are very popular. In particular, we have opened a drone program related to ag services that has been very popular.
—District-level administrator—Career and Technical Education | Idaho

Vocational Agriculture and Information Tech. I believe it is due to our instructors and how they connect with our students along with their innovative teaching styles.
—District superintendent | Oklahoma

'Kids are realizing that college is not required to get a good-paying job'

Marketing is the most popular. Students believe that it is a high-value, high-pay opportunity.
—District-level administrator—special education | State not available

All students at my school are required to take one or more CTE courses.
—High school teacher | Nevada

All the programs are popular and have waitlists to get in. Very competitive, more than in the past. Kids are realizing that college is not required to get a good-paying job.
—District-level administrator | Ohio

Courses that offer paid apprenticeships/internships.
—District-level administrator | State not available

Entrepreneurship and Marketing—social media influencers. Investing—stocks, cryptocurrency. Construction—skilled trades and joining a trades union. College is getting too expensive.
—District-level administrator—Career and Technical Education | Massachusetts

Graphic design because students get to take their creativity to another level.
—Middle school teacher | Georgia ■

Published November 19, 2025

Why Schools Are Adding to Their CTE Offerings, And What Could Slow Them Down

By Arianna Prothero

A majority of educators say their districts' career and technical education offerings are increasing, driven in large part by growing student demand.

That's according to an EdWeek Research Center survey of teachers, principals, and district leaders who are connected to CTE. Six in 10 educators report that their districts' CTE offerings have grown in the past five years, compared with fewer than 1 in 10 who say their districts' offerings have decreased.

However, schools face challenges in growing their CTE programs, even when demand is high, due to staffing shortages and a lack of facilities and equipment.

The most cited reasons for growth in their CTE offerings were rising student demand, increased support from district leadership, and growing interest from existing industry partners and employers, according to the survey.

More than two-thirds of educators in the EdWeek Research Center survey said that students' interest in CTE has increased either a little or a lot in the past 5 years.

Why are more students pursuing CTE coursework? The most common reasons, according to the survey, are students' genuine interest in a particular career path; they find CTE coursework engaging and interesting; and they're encouraged by parents, families, friends, and teachers to take CTE classes.

Many students are drawn to CTE because it offers a more affordable career trajectory than a traditional four-year degree and has more hands-on learning experiences, said Diane Waite, a business and marketing educator in Mounds View Public Schools in Minnesota.

"We are seeing a much larger shift of students to career and technical education because of the practicality of the content and the correlation to direct careers," as well as increasing demand from industry, she said.

In particular, CTE offerings in digital technology, IT, AI, and cybersecurity have grown, with 28 percent of survey respondents saying in the EdWeek Research Center survey that their district or school has started offering courses in those fields in the past five years. Another 31% expect their school or district to introduce offerings in those fields in the next five years.

iStock

When asked what—if anything—would lead to major improvements in their CTE programs, the most cited responses were additional funding to add courses/pathways (56%), additional resources for facilities/equipment (49%), and additional CTE teachers (46%). About a third of respondents said that making it easier to hire industry professionals as instructors—even if they are not certified to teach in K-12—would benefit their programs.

CTE teacher shortages are a big challenge in many districts

The survey found that 8 percent of educators said their school's or district's CTE offerings had decreased over the past five years. Among those who noted a decrease, 39 percent said the top reason was difficultly recruiting qualified instructors. That was followed by declining student enrollment (36%), insufficient student demand (32%), and declines in overall education funding (32%).

"Without proper funding, we do not have the ability to update space and equipment," a deputy superintendent in New York shared in the EdWeek Research Center survey. "We do this as we can. Increased funding for CTE would be helpful."

"I believe our programs are doing the best they can with what they have, but reduced funding from the state has forced us to increase CTE class sizes beyond what we would like in order to meet staffing allocations," said a district-level administrator in career and technical education who is based in Florida. "This makes it more difficult for the teachers to focus on hands-on learning as this is made more difficult with 30+ students in each class."

Said a CTE administrator from Pennsylvania: "We are limited on space, and once a class is full, a waiting list has to occur due to the space constraints. Some students who are wait-listed may not have an opportunity to attend." ■

Additional Resource
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E+

Published December 31, 2025

CTE Is on the Rise. Here's What Educators Say Would Make Programs Stronger

By Arianna Prothero

There is a surge of interest in career and technical education programs at the secondary school level, fueled by concerns about the cost of college and opportunities to make good money in jobs that require technical skills, sometimes right out of high school.

But how well are those programs performing?

Most educators feel the overall quality of their CTE offerings is good, but still see room for improvement. That's according to a nationally representative EdWeek Research Center survey that asked teachers, principals, and district leaders whose jobs include some CTE work to assign a letter grade to their CTE programs. Nearly half of them gave their CTE programs a B.

But what makes an A-rated CTE program? (Twenty-three percent of educators gave their programs an A rating.)

While many factors go into creating a high-quality CTE program, some of the key reasons cited by educators in the survey are good facilities, strong partnerships with local businesses, diverse course offerings, district- and state-level support, quality instructors, and high student enrollment numbers.

"We update our curriculum regularly, we offer multiple concurrent enrollment courses, we market our programs extensively and we have highly motivated and engaging teachers," a district-level CTE administrator in Connecticut shared in the survey.

"Our CTE program works very hard to accommodate students and gets them into the program that they request," said another district-level administrator in Michigan. "Students earn a quality education while enjoying the hands-on learning. Students look forward to getting into CTE."

Said a middle school teacher in Texas who rated their CTE program with an A: "I chose the selected [letter] grade because of my experience working as a CTE teacher. Our administrator totally supports our programs, students, and teachers and licensed instructors."

Educators identify big challenges for some CTE programs

Still, plenty of educators in the survey acknowledged that there was room for improvement. Some of the challenges top of mind among educators who rated their CTE offerings a B or lower included lack of funding for facilities and equipment, inadequate amount of space, not enough teachers, and a lack of rigor.

"We would have more programming if we had adequate space," said a district-level CTE administrator in Virginia. "Additionally, we need more teachers. It would be helpful if there were easier pathways for people to teach CTE courses, especially in the trades."

A district administrator in South Dakota added: "We have teachers new to the profession. They need extra time to fully develop their classroom activities to the point where CTE classes/programs reflect the outside world."

A district administrator from Oregon who works in student services raised concerns about the rigor of the district's CTE program: "We have students taking CTE pathway programs, but very few pursue careers in those areas after high school. Students are taking CTE classes because they are fun and easy rather than to prepare for the future."

Others pointed out that their middle school CTE programs are not well connected with the ones in high school.

"Our district has many offerings and opportunities for students within CTE, but we lack alignment in terms of which students are enrolling," said a middle school principal in California. "Despite having some CTE programs in middle schools, they do not connect to the more advanced programs at the high school, thus affecting enrollment and pathway completion."

Despite the challenges, many educators in the survey reported that their CTE programs are growing. In fact, enrollment in K-12 CTE programs increased 10% between the 2022-23 and 2023-24 school years, from 7.8 million to 8.6 million students, according to the U.S. Department of Education.

It's a trend likely fueled by both state policymakers investing more in CTE and students and parents increasingly questioning the payoff of traditional, four-year college degrees.

Six in 10 educators said in the EdWeek Research Center survey that their districts' CTE offerings have grown in the past five years, compared with fewer than 1 in 10 who said their districts' offerings have decreased. And 71% of educators said their students' level of interest in CTE has increased either a little or a lot in the past five years.

Pathways related to digital technology, artificial intelligence, information technology, and cybersecurity have seen the greatest increase in interest, according to the survey. ■

Additional Resource
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RETURN TO PAGE 1

Adriana Zehbrauskas for Education Week

Omar Muñoz teaches high school student Caden Wang, 15, during a class on semiconductor manufacturing at Hamilton High School in Chandler, Ariz. Districts across the country are looking for people like Muñoz, who has three decades of industry experience, to teach their CTE courses.

Published January 07, 2026

How This District Works to Attract And Retain Hard-to-Find CTE Instructors

By Elizabeth Heubeck

Chandler, Ariz.—

Omar Muñoz trained as a chemical engineer and worked for almost 30 years as an industry executive, most recently in management at Intel Corporation here. Recently, the mid-career professional began to re-evaluate his priorities and consider a new direction.

His children were nearing high school, and he thought about how he could spend more time with them before they'd graduate. Simultaneously, Intel offered an early retirement option. Then a friend sent him a job posting from the Chandler Unified school district looking for a career and technical education instructor to teach engineering, automation and robotics, and semiconductor manufacturing. He applied, and was hired for this school year as the district's first instructor for its new CTE program in semiconductor manufacturing.

The timing proved fortuitous not just for Muñoz, but also for the Chandler Unified, a large and growing suburban district outside of Phoenix that needed a CTE instructor with experience in the niche world of semiconductor manufacturing to launch its inaugural program.

"He was like our golden ticket. He was retiring, and he was looking to keep working," said Lindsay Duran, director of CTE at Chandler Unified. "What better place to utilize his knowledge that he brought into the next-generation workforce?"

These sort of win-win hiring circumstances are rare when recruiting CTE instructors. Over half of all states (28) reported CTE teacher shortages to the U.S. Department of Education in the 2023-24 school year. Administrators responding to a national 2024 Brookings Institution survey said they had trouble filling CTE positions 57% of the time, compared to 39% of the time when recruiting teachers for academic positions.

Further, possessing an occupational license or expertise in a "high-growth" CTE area makes CTE instructors more likely to leave the teaching profession, the Brookings report concluded—often for a return to better pay and fewer hours.

Duran in Chandler knows these challenges all too well. The district was forced to shutter its certified nursing assistant CTE program at one of its high schools after the teacher, a nurse with industry experience, chose to return to the field for higher pay and a better work-life balance. The district posted the vacant position for several months unsuccessfully and eventually decided to end the program.

"It's hard to keep them because they're going to make less money working way more hours," Duran said.

But with a recent rise in CTE offerings, driven largely by growing student demand, districts need to find ways to recruit and retain qualified professionals to teach these practical, skills-based, hands-on courses. There's no silver bullet, of course.

And pay differences between industry and K-12 education jobs will likely remain an obstacle—especially in emerging technology fields like cybersecurity and semiconductor manufacturing, where professionals could make three or four times more in the private sector than in teaching, observed Alisha Hyslop, the chief policy, research, and content officer of the Association for Career and Technical Education.

Despite these challenges, districts committed to CTE—like Chandler Unified, where students can select from among such 21 programs across its six high schools—use a number of strategies to find qualified candidates and support them once they're hired.

Support for strong CTE instruction starts at the top

Leadership support dictates, to a large extent, the success of district initiatives. Hiring and retaining qualified CTE instructors dovetailed with several goals outlined in Chandler Unified's most recent strategic plan, such as developing engaging learning environments; integrating real-world learning experiences into the classroom; and establishing industry partnerships that integrate students' interests and guide them toward successful career pathways.

"Our superintendent wanted to make sure our students are workforce-ready and knowledgeable," Duran said.

For students studying in the district's marketing CTE pathway and looking for work-related experience, for example, the district might try to connect them with an internship in a marketing firm—providing them with more relevant experience than the typical teenage job at a fast-food chain.

"We want to give them bigger opportunities," Duran said.

Local business connections help create

these opportunities—not only for student experiences but also for strengthening the CTE programs in general, which can include growing a pipeline of prospective instructors.

"We're constantly talking to our community partners, whether it's the chambers or city business partners, and just saying, 'Hey, we're getting ready to do this program, or this position has an opening, do you know anyone?'" Duran said.

The district also created two positions within the last few years, each of which commits time to growing connections with the local business community.

Janet Hartkopf, who formerly taught high school cybersecurity courses in Chandler and, earlier in her career, trained professionals in technology, was recently tapped to become the district's emerging technology coordinator. When the district decided to pursue the new CTE program in semiconductor manufacturing, Hartkopf said she picked up the phone and called 50 local companies connected to the industry. Eventually, representatives from some of these companies became advisers to the program.

Three years ago, the district hired Tiffany Bellows, a workforce development coordinator who worked for Boeing for 20-plus years before accepting this role, her first in an education setting. Her deep industry knowledge and connections have helped the district grow its own network of community-based business partnerships, making it easier to get the word out to industry professionals about open CTE positions.

Instructional specialists provide a layer of support for CTE instructors

Hiring a qualified industry professional as a CTE teacher is just the first hurdle in ensuring students get adequate instruction. Like Muñoz, most don't have teaching experience.

While each state's requirements for teachers vary, Arizona's department of education provides five ways for these CTE instructors educators to get their teaching license.

For instance, CTE instructors with a bachelor's degree in their area of concentration, plus 240 hours of work experience, can receive certification. Hires who come directly from industry and can prove—with a signed form from their former company's HR department—that they've worked 6,000 hours in the field in which they'll be teaching can qualify to be certified without a bachelor's degree.

But these career-switchers still need help learning how to teach students, Duran said. Classroom management and learning how to present often-complicated material are common skills these instructors need to hone.

The district's five instructional specialists, each dedicated to a specific CTE cluster, provide that needed support.

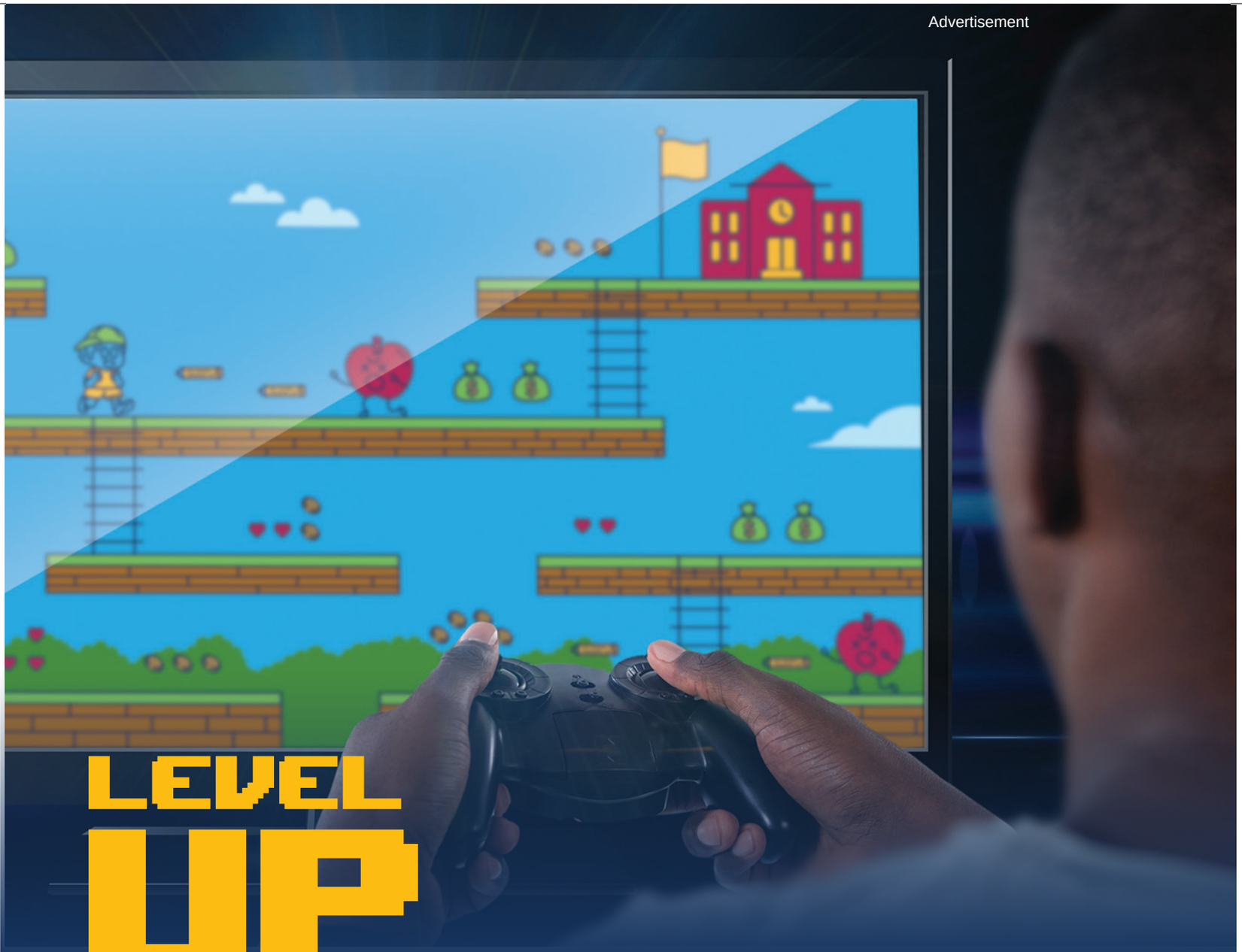
Years ago, Duran served as the lone instructional specialist for all CTE programs before moving into her current role. Like the instructional specialists currently employed by the district, she had a teaching background. But she was stretched thin and thrown into CTE programs she knew nothing about.

"I told our administration: 'We need people that are experts in these fields,'" Duran said. And they listened.

The district's current instructional specialists, each of them former teachers with backgrounds in the industry clusters they're supporting, work closely with CTE instructors for their first three years, then on an as-needed basis after that. They sit in on the class, sometimes co-teach, and otherwise assist with instructors' needs.

For Muñoz, that extra support included knowing how to motivate and manage a class of high school students.

"I used to manage technicians, but this is different," he said. "Here, you have to know how to approach behavioral issues. And sometimes, the knowledge and motivation levels with a class really vary." ■



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Published November 12, 2024

How This District Works to Attract And Retain Hard-to-Find CTE Instructors

Teacher recruitment needs to start in high school. Here's how

By Sharif El-Mekki

Public education is awash in efforts to accelerate the connection of young people with career pathways in high school. All across the country, school systems are partnering with the private sector, higher ed., and community partners to create sophisticated, career-connected learning experiences. Children in middle school and even younger are increasingly exposed to the world of work and potential careers.

One profession often conspicuously absent in this rush to bolster career and technical education pathways is teaching. It's a missed opportunity, especially amid efforts to diversify the teaching workforce.

It is stunning to see that, in many places, teachers are only recently being recognized as a critical part of America's workforce—despite being one of the largest employment sectors, with some 8 million people working in elementary and secondary schools across the country!

In this biweekly column, principals and other authorities on school leadership—including researchers, education professors, district administrators, and assistant principals—offer timely and timeless advice for their peers.

Addressing the discrete and enduring teaching shortages faced by many cities and rural areas would be reason enough to embrace a CTE-style approach. Districts are struggling to fill teaching positions, particularly in low-income communities, as well as high-need areas such as special education, dual language, math, and science. By integrating teacher education into CTE programs, we can start to address this shortage.

CTE programs have been proved to be effective in not only preparing students for the workforce but ensuring high school completion. Students who participate in CTE programs have higher graduation rates and are more likely to enroll in postsecondary education, according to a recent study from the Institute of Education Sciences. By applying this successful model to teacher education, we can ensure that students are not only prepared to enter the teaching profession but are also equipped with the skills and knowledge they need to succeed.

At the same time, thoughtfully designed programs can create a pipeline of diverse, well-prepared teachers who are ready to step into classrooms and make a difference.

Often, school leaders sit like baby birds awaiting mommy bird (human resources) to send them diverse teachers. They lament teacher colleges for not preparing the effective teachers they need. Meanwhile, they are oblivious to the critical role they could play in developing the entry points for an effective teacher pipeline.

When I was growing up as a Black boy in Philadelphia, society eagerly funneled boys like me into sports and music. The available CTE opportunities—such as cooking or auto mechanics—didn't appeal to me, but I would have been interested in exploring a career in teaching while in high school.

Schools weren't safe havens or places of inspiration for many Black and brown children like me; they were underresourced and overpoliced. It's no wonder why Black men make up less than 2 percent of the teaching population. This absence of Black teachers in schools is not just a missed opportunity for representation. It is a critical gap that hinders the academic and social-emotional development of students.

My own perspective on teaching didn't shift until after college, when my mentor, Martin Ryder, extended an invitation for me and other young Black men to consider a career in education. That invitation was life-changing—not just for me but for the scores of students I would eventually teach. Sometimes, all it takes to unlock a passion hidden beneath layers of societal expectation and institutional neglect is an invitation.

We need Black teachers, and the least we can do is to support students in exploring becoming one—early. That is why creating a welcoming entry to teaching in high school with the same seriousness and structure as other CTE pathways could be a game changer.

Just as we have programs that expose students to careers in health care, engineering, and the trades, we need robust programs that introduce students—especially those from underrepresented communities—to the teaching profession. Being a student for 13 years, isnt enough.

Teaching pathways like "grow your own" and apprenticeship models are not just innovative, they can be essential tools for continuing to diversify the teaching profession. They represent the continuation of a proud tradition in the Black community: the tradition of Black educators bringing the next generation into the transformative work of teaching.

For example, educators at Science Leadership Academy, a magnet high school in Phila-

delphia, have partnered with my organization, the Center for Black Educator Development, to provide high school students with early exposure and clinical experiences. These students take CTE courses that expose them to Black pedagogical frameworks, Black teaching traditions, and education through a Black historical lens. They explore how Black educational and behavioral theorists, child psychologists, educators, and communities have engaged in teaching and learning. They use their knowledge and apply it in their clinical experiences.

Since launching this teacher pathway program in 2020, we have seen how participating students' interest in teaching increases as they identify teaching as a pathway to educational and racial justice.

School leaders can reshape teacher preparation by creating teaching pathways in high school, including through robust career-connected learning and on-the-job experience. Such exposure to real-world work demystifies the teaching profession, allows students to see the impact they can have as teachers, and positions them for greater success in postsecondary teacher-preparation programs and beyond. So many skills that are critical in teaching—communication, empathy, leadership—are developed over time and with practice.

By exposing students to the teaching profession early, we can help them develop these skills, while at the same time building a personal understanding of what it means to be an educator.

As a Black male educator who understands the essential experience of being seen, heard, and welcomed into the profession, I see the creation of teaching pathways in high school as a natural extension of the historical Black educator tradition of bringing our young people into the revolutionary work of teaching Black children well. This tradition recognizes that teaching is not just a job; it is a calling, one that requires passion, dedication, expertise, and a deep commitment to social justice.

Creating avenues to pursue this noble tradition in high school can ensure that the next generation of teachers better reflects the diversity of our student population and is prepared to meet the challenges of the 21st-century classroom. By doing so, we'll ensure that teaching is a career option that welcomes all young people. ■

Sharif El-Mekki, a former principal and teacher, is the founder of the Center for Black Educator Development.

Published by Editorial Projects in Education, Inc.
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