

Power Technical: Preparing Educated and Ethical Leaders in the Trades

Education Policy Center
Independence Institute



On the eastern outskirts of Colorado Springs, a unique public school is serving students who have chosen to explore career opportunities in trades or engineering fields. Built around its Career and Technical Education (CTE) program, Power Technical (PTEC) is a school in the James Irwin Charter Schools network.



PTEC is rather unlike most schools and the building it occupies reflects this well. One of the school's noteworthy features is the lighthouse at its southwestern corner. The lighthouse is there because the building was constructed to house a large church. Principal Rob Daugherty is quick to mention that most of the original structure consisted of a large hall where in places there was no flooring. Daugherty designed the second floor, oversaw its construction, and is prompt to point out the building's quirks and idiosyncrasies.

The school's two levels are in many ways separate but they also work closely together. The ground

floor houses the majority of the administrative offices and four technical workshop classrooms dedicated to welding, construction, woodworking, and machining. Here there are also a handful of smaller classrooms used for subjects like engineering, robotics, and other computer-driven courses. The rooms upstairs are where instruction in the core academic subjects takes place.

The two disparate levels of the building blend seamlessly into a coherent and purposeful whole. At PTEC there could be no downstairs without the upstairs and a student's day is therefore split between the two floors. Daugherty points out that

in his mind's initial vision the school was going to consist of two buildings: one dedicated to academic instruction and the other was to serve as the space for shop classes. This, he says, was largely the product of his own experience with career training in high school. The building he found forced him and his fellow administrators to reconsider their original ideas. What emerged was a school structure very much in line with the way Career and Technical Education is currently conceptualized, namely as a seamless integration of specific career preparation and core academic instruction.

Power Technical is a relatively young school but the James Irwin Charter School network, which operates five schools across three Colorado Springs campuses, predates PTEC by about a decade and a half. James Irwin Charter High School, located a few miles to the south of PTEC, opened in the year 2000. The school aims to meet the lofty goal of both stressing a rigorous liberal arts education and of implementing a traditional vision of character formation. James Irwin founders sought to help nurture a generation of Americans equipped not only with a body of high-level knowledge, but also with the moral foundations necessary for its application.

Over the next few years, the James Irwin network grew to include a middle school and two elementary schools. All of the schools share the initial founders' commitment to character education while also adhering to the principles of Direct/Explicit Instruction and using the Core Knowledge scope and sequence through the middle school level.

After a decade and a half of continued success and growth, James Irwin administrators (who then included Daugherty as the high school's dean of students) felt the time had come to begin addressing the academic needs of students who may not necessarily wish to, or who are not able to attend a four year university, but who nonetheless want to obtain a great education that prepares them for future success.

Though the school itself has an interesting story, PTEC's students are its most remarkable facet. Most of them (or, if not most, then an astonishingly high number) know exactly why they're there and what purpose their education will serve. And just like many students at the Colorado Springs school know why they are there, so too does the school know its role and who it serves.



PTEC serves students in grades 6-14. There are many middle/high schools across the state of Colorado, but middle/high/community college schools are out of the ordinary. How did this arrangement come about?

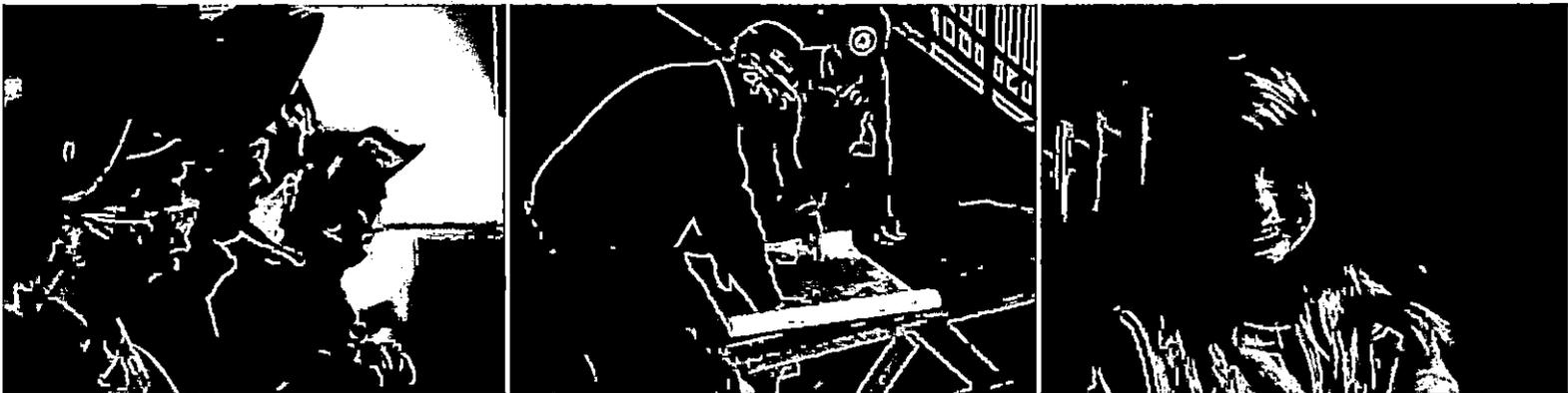
At the risk of some confusion, PTEC operates as it does in part thanks to P-TECH, a state of Colorado initiative signed into law by Governor Hickenlooper in 2015. P-TECH, or “Pathways in Technology,” seeks to address some of the same concern as PTEC. Chief among these is the low rate of participation in middle-skill jobs suited for employees with associate degrees or certificates but not necessarily requiring four-year degrees. The Pathways in Technology model was developed in New York through a partnership with IBM and aimed to address employment needs in the IT sector.

P-TECH allows school districts to enter into partnerships with local community colleges and local industry partners to create six-year educational programs. Upon completion, students will have obtained a high school degree as well as an associate’s degree in a high-growth, generally STEM-focused field. The associate’s degree at the end of a pathway has to be connected to the instruction provided at the partnering secondary school. This means a PTEC student will obtain a post-secondary degree related to a skilled trade. This makes the school more unique still, given that across the state P-TECH programs focus mostly on careers and degrees in fields related to information technology. It is also crucial to note that P-TECH students must obtain relevant workplace experience, whether in the form

of internships, apprenticeships, mentoring, or workplace shadowing.

The creation of the Pathways program proved to be a fortuitous coincidence for PTEC, which at the time was a charter application without a school district to call home. Linda Carroll, currently the Director of Advancement at James Irwin Charter Schools, points out how the network (led by Jonathan Berg, its CEO) had wanted to establish a trade-focused charter school for several years but had no success in finding a partnering school district anywhere in Colorado Springs. “At that time, nobody wanted a trade school,” Daugherty explains, “it was politically bad in their minds, and now that we have this one operational, we see districts across the area looking to open programs of their own.”

As luck would have it Falcon District 49 had expressed some interest in the newly established P-TECH program. Soon the James Irwin trade school had a home and was well on its way to becoming more than a dream. PTEC’s district partnership also helps explain its location on the city’s outskirts. Once talks with District 49 began to head in the right direction, Berg and Daugherty found the current building and the latter spent a weekend drawing up preliminary blueprints. It should also be noted that PTEC and District 49 have a relationship amicable enough for the district to share its allotment of Career and Technical Act (CTA) funding with the school. This isn’t the case for all district-authorized charters in Colorado even if they meet all the qualifications required for this funding.





Currently, PTEC is one of a small handful of P-TECH schools across the state. Indeed, it was one of the first programs to receive approval to operate under the P-TECH umbrella. In part because the school is so new and in part because the P-TECH program was adopted so recently, only a small minority of students at PTEC are currently on track to attend college as 13th or 14th graders. Principal Daugherty hopes to raise this figure over the coming years.

When PTEC opened its doors in 2016, enrollment was just under 200 students in grades 6-10, though there were only a dozen or so 10th graders that year. According to Daugherty the plan was to open the school only to 6th through 9th graders but there was enough interest from prospective sophomores that the school felt it should address their needs. With the benefit of hindsight, Daugherty admits this made things hard on the young school as it needed to develop a special curriculum, scheduling, and so on for a very small handful of students. Daugherty is confident, however, that the students' education and experience did not suffer.

In 2019-20, three of the ten students who made up the first graduating class attend Pikes Peak Community College. They come to PTEC only for special occasions and are Colorado's

first cohort of 13th graders. The trailblazing class enrolled under the assumption that they would not be eligible for the community college program because the Pathways in Technology funding stream was going to be available beginning with 2020 graduates. But as those students moved closer and closer to graduation, PTEC administrators convinced the Colorado Department of Education to make the necessary exception.

While the tail end of a student's education at PTEC is certainly a unique dimension of the school's program, it is worthwhile to see how a student's full academic experience at the school might look.

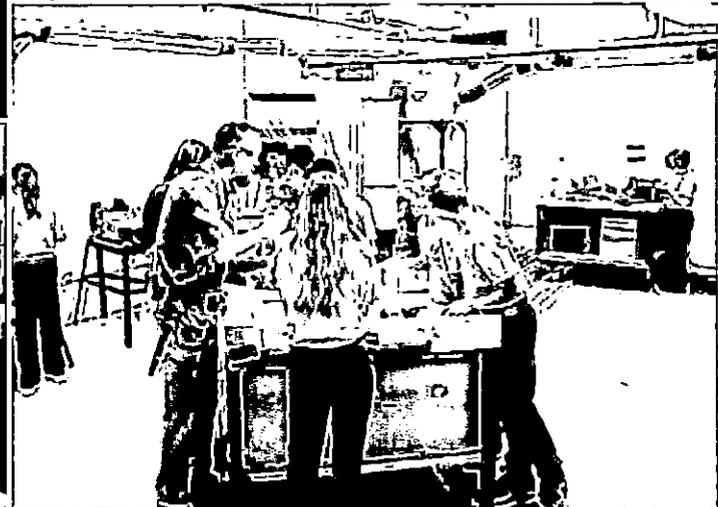
PTEC's mission draws students from across the Colorado Springs area. When it comes to school demographics, boys make up 80 percent of the student population. The faculty and staff at PTEC aren't shy that this influences much about how the educational program is implemented. Especially in the middle school age range, Daugherty notes, boys tend to have very little natural interest in sitting in a classroom and passively absorbing information that's presented to them. In order for it all not to feel like a chore, administration created and implemented a "why" component to the curriculum. The challenges

associated with addressing the “why” questions in the classroom are exacerbated today by the fact that kids play outside or help their parents work (be it at home or in a workplace) at rates far lower than did previous generations. Consequently, analogies for classroom content—for instance the relationship between parabolic equations and throwing a football—are not readily available to teachers like they once were. Consequently, career training in the skilled trades provides a potential way of helping illustrate the answer to the many “why am I learning this?” questions that inevitably come up.

Elaborating on the “why” component is easier in some settings than in others, and it is certainly easiest in the dedicated CTE classes. Students at PTEC take 90 minutes of shop (or CTE) per day, but shop doesn’t include only welding, woodworking, or construction. It also embraces subjects like computer-aided drafting and electronics. In the middle school years, students

will cycle through the available offerings one course at a time. Only later do students pick a specific focus around which their educational and career plans are made.

The CTE course offerings are diverse and what is taught in each will vary by grade level. In a 6th grade woodworking class, one might see what initially appears to be a swarm of kids conducting all sorts of experiments aimed at testing the performance limits of power tools. One student might be operating a drill or attempting to replace its bits. Another will stand by the lathe eager to show anyone who is at all interested how he can round off a large chunk of wood before working it with a finer blade and coming just to the point where the metal begins to char the wood (spinning at a slightly higher speed than recommended) before pulling the blade back and repeating the same maneuver a quarter of an inch further down the bit of wood.





With youngsters like these, instructor Scott Heim's goal is to get the students acquainted with the basics of workplace safety and to make them comfortable around tools that may sometimes seem dangerous or be unwieldy. Heim relishes in seeing his students find problems around the shop. For instance, when in the first week of a semester he showed his class how and when an emergency shower is to be used, one pointed out how its use might damage a relatively pricey piece of equipment positioned nearby. A couple days later, a wooden shield built by the students hung next to the shower area. Another student created a set of wooden cases in which others now carry their tools. Every time a student creates a solution to a problem around the room—no matter how small or mundane—Heim

has them draw or etch their initials for future students and guests to see.

Down the hallway is the room dedicated to welding. There, instructor Trevor Bartosik feels right at home in a room that bears the unmistakable smell of a shop dedicated to metalwork—a smell that isn't unpleasant per se but admittedly takes some getting used to for most. He's worked in manufacturing for two decades and only began his career as a high school CTE instructor in the fall of 2019. Unlike many new teachers, he finds the work easier than he had expected. There may be small challenges here and there, but for the most part, his students enjoy learning what he has to teach them. He believes the results are clear, as



he points to a set of welding samples that his students had submitted as their final projects earlier in the week. To the untrained eye all these welds look similar, if not the same. But Bartosik is quick to point out the imperfections in some, some pockets of air, some places where the weld bunches up and isn't as smooth as it ought to be. One sample, he says as he holds it up, is particularly exemplary and the student who created it would, probably, pass a college-level examination on first try. Some of his first semester students can already do intricate vertical welds, which, again, means nothing to the uninitiated, but that's the point—students at PTEC receive a high level of very specialized industry-level training that gives them skills that stand out in the eyes that actually matter, namely those of prospective employers.

Next to the welding shop is the construction classroom. This room is empty more often than not but only because construction instructor Angelo Jaramillo and his students can typically be found outside, in a lot north of the school,

where they're building a house. The finished product will measure around 1200 square feet and will be a functional house built with a permit, in accordance to regulations, and according to a blueprint. The construction project is a testament to the school's partnership with the local Housing and Building Association, which not only provided the blueprints for the house but also helps pay for some of PTEC's students' construction industry certifications.

The house is being built on a set of stacked wooden support stands so that, once finished at the end of a school year in May, it can be lifted off the ground, transported away, and sold. 2019-20 marks the first academic year in which the house project is the centerpiece of PTEC's construction program. The plan is for a new home to be built and sold each year to continue financing the school. The money will certainly come in handy as the school looks to expand in the coming years.

Students at different grade levels perform different tasks on the build but all have some



role in it. And so, during one period, a group of 7th graders will put in a few joists in the floor while struggling to both carry them and navigate the duckboards made necessary by the previous week's snowfall. A couple hours later, the 11th grade class will come, and in the same amount of time, will set a dozen beams. The house build is a project that students from most of the school's programs will have some impact on and will all be able to take some pride in. For example, one student from a machining class points out the brackets he made which are used to attach the joists hung that day. Similarly, while a construction class works on the house itself, students from a welding course can be spotted working on the gate leading into the construction site.

Jaramillo, PTEC's construction instructor,

comes from a family of builders and has been on construction sites since an early age. Early on, he did not follow in his family's footsteps and instead entered the world of finance, though even in that job, he managed to spend much time on jobsites as he worked in loan appraisal. But after a few years in banking Jaramillo returned to construction and not long thereafter he began teaching as a CTE instructor.

In his second year at PTEC, Jaramillo is among the school's longest tenured CTE staff. High



rates of teacher turnover are an issue that many CTE programs cite atop lists of their biggest challenges. Oftentimes, the persistence of this challenge will be explained with the notion that candidates with enough experience in their



respective fields to make them valuable CTE instructors can likely earn far more by staying in their respective industries. Curtis Jameson, PTEC's hands-on CTE coordinator, tends to disagree and instead believes that "It takes a teacher to be a teacher." What he means is that those who enter the CTE instruction world know full well what the financial implications of their career shift will be and end up leaving because their view of teaching is either misconceived or because they are not cut out for the job, not because they aren't making as much money as they would be otherwise. In other words, teachers know what they're getting into on one level, but they end up not knowing what they're *actually* getting into. Or as Jameson puts it, "You can't fake being a teacher."

In addition to its CTE-focused instructors, PTEC also employs a sizeable staff of teachers tasked with providing instruction in the core subjects

taught upstairs. There, every teacher faces a set of challenges unique to his or her field. But where the immediate relevance of subjects like math, or physics, or other sciences to an education in skilled trades is readily explicable, teachers like Kelly Dias, who teaches history at various grade levels, have to handle far more difficult a task. However, she would never say this is an insurmountable challenge.

Dias has degrees in Russian Studies and International Affairs and started on her path as an educator as a substitute teacher with the James Irwin network while her son was in kindergarten. At PTEC, Dias has taught "a little bit of everything" but has primarily worked in liberal arts subjects. Currently, Dias also works as a mentor for students who are struggling and are placed in end-of-day labs to receive the extra help they need.

Dias acknowledges it takes some hard work and ingenuity to make history appear directly relevant to a CTE student. As a result, Dias has come to focus more on architecture and art when covering ancient civilizations than would teachers at other schools. While the students think they are learning just about the architecture of a place like Ancient Athens or about Roman roads or aqueducts, she can weave and sneak in the crucial content which to her students may seem peripheral.

Some of the issues, however, are not unique to CTE-focused schools. Dias recalls asking herself, "If my students never leave this city, if they never leave this state, how am I going to get what happened 2000 years ago in Greece seem important to them?" This is a question history teachers at any level and at any school have at some point addressed. Dias says her students are as good as- or better than their traditional public school peers at understanding the "big picture" of what she is hoping to convey while the coverage of specific and intricate details is something to which she deliberately devotes less time and attention.

While in one sense teaching history or English poses a challenge quite unlike any other classes at PTEC, it also provides its teachers with some unique opportunities. This is notably the case

in the area of character training, where issues, debates, and ideas from the past are available to help grapple with today's questions.

PTEC's character education component, a commitment to which the school inherited from its parent in the James Irwin network, is also designed to answer a core set of challenges unique to today's world. The character program begins in the 6th grade and runs through graduation. Incoming students first receive instruction in study skills as well as in dealing with peer pressure and bullying. 7th graders learn about setting goals and managing relationships, while 8th grade students learn about work ethic as well as health and wellness. "Health and wellness" means different things in different settings. At PTEC it involves an emphasis on such seemingly trivial things as the importance of stretching before physical work.

The character program focuses on skills broadly necessary for success in school and life for the first three years. In the high school grades, the program shifts to also include communication, leadership, business management, financial ethics, personal finance, and entrepreneurship. In all these areas teachers often have to challenge narratives which are gaining much political traction today. For instance, instructors have to stress the importance and efficacy of profit



in the business world, which is no longer as commonsense a proposition as it once was. Character education doesn't take place only within designated character courses. Amanda Spiller, an earth science teacher, mentions that there is never a shortage of possible "character moments" or "empathy moments," for instance when a teacher drops a stack of papers and receives no help from passers-by.

Spiller is also quick to point out that all teachers are also, in fact, character teachers. According to the school's administrators, there is little top-down coordination when it comes to the character component of PTEC's mission, as all teachers who are hired are expected to demonstrate a commitment to the traits the school wishes to impart on its pupils. Spiller joined the school around the time of its founding and has watched it grow into the tight-knit community it is today.

The community dynamic of the school is another aspect that bears highlighting. In the most mundane sense, this pertains to the cooperation between "upstairs" and "downstairs" instructors. For example, Theodore Reynolds, a first-year physics teacher mentions having worked with a shop class to create some materials needed for an in-class demonstration. More importantly, there is a demonstrable sense of investment in the school which one quickly gleans from talking to PTEC students. David, a 10th grader, testifies to this perfectly.

David comes from a family of skilled tradesmen. His grandfather is a welder and has been one for 60 years, his father has worked as a diesel mechanic and has built houses, and his brother is a welder currently working toward a post-secondary certification. He recalls being exposed to the trades for most of his life, so in a way going to a school like PTEC seemed like a no-brainer.



But it wasn't necessarily the fit in interests that served as the deciding factor when he enrolled in the school; instead, David recalls having a particularly hard time in some core subjects like math at his old middle school.

Since coming to PTEC, his grades have shot up beyond what he'd ever expected. But in David's case, it wasn't necessarily the school's emphasis on the direct real-world applicability of traditional academics that has served as the key catalyst for his success. Instead, he ascribes it to the genuine personal care and attention he has received from teachers at PTEC. He is now among the ranks of the school's upperclassmen and is trying to reciprocate and expand on his teachers' commitment. When speaking of the school, David always and naturally refers to it as "us" or "we" and cares about the academic and career success of all his schoolmates. The school's emphasis on the leadership dimension of character education has in turn allowed David to put his commitment into practice as he has already served as a teacher's assistant in all of the shop classes he's taken.

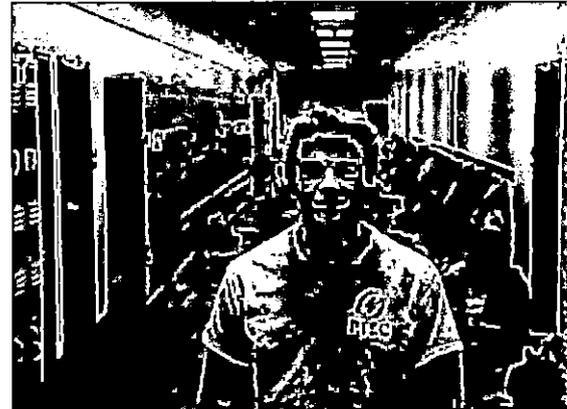
Furthermore, David is a perfect example of what has already been briefly mentioned above: PTEC students know why they're in school and what their education is meant to accomplish. This manifests itself in two distinct ways. First, David *knows* that upon graduation he will enroll in a four-year university where he hopes to obtain a degree in architectural engineering. Izrael, an 11th grader is similarly aware of his plans beyond high school. In his case, these hopefully involve a mechanical engineering degree from Denver's Lincoln College of Technology. Such perspectives immediately strike one as refreshing considering that so many students who enter (or even complete) four-year universities have no idea what they hope to do afterwards. Among PTEC's students, especially in the later grades, this is not the case: most of them will say, "I am currently focusing on subject X, when I graduate I will study Y at college Z, and this will allow me to have the job I want to have."

When asked about how the school does it, how it successfully guides students to arrive at such

long term plans, Chad Baker, PTEC's Dean of Students, acknowledges he is very happy with the pattern but admits he finds it pleasantly surprising. There is no magic wand when it comes to career planning and hence there is no concerted effort to align all of a student's education in such a way as to make the big decisions seem easy or natural. Instead, it's a matter of a whole system working well.

Amanda Spiller points out that even in her courses, which aren't directly tied to a specific skilled trade pathway, there are countless opportunities for her to guide students to find what inspires them or what they enjoy learning about. Knowing what a student wants to do, in turn, is not only immeasurably valuable for the student in question, but also helps the teacher know how to "get to" that particular pupil and guide them toward success.

During a student's time at PTEC there is a key point which helps them in making plans for the future. In the 10th grade, students at Power Technical have to choose between one of three different paths to follow. Students have to decide whether they wish to enter the workforce immediately upon graduation, take advantage



of the Pathways in Technology 13th and 14th grade track, or pursue a degree at a four-year university. The decision has to be made relatively early in part because the structure of instruction varies between the three different paths. If a student wants to begin working immediately upon graduation, they will be guided toward certifications and internships or apprenticeships to help ensure success. If a PTEC pupil wishes to follow the Pathways in Technology program and continue on to community college, their education at PTEC will continue for the most part as it did. Finally, if a student aims to attend a four-year university, he or she has to meet a certain set of standards and take certain courses (such as a foreign language).

Future-planning is one of the ways in which PTEC students demonstrate they know why they are in school, but there are others. Reid, is an 11th grader in the construction program. In addition to attending school, he works a full time construction job after school and during the weekends. Reid is one of many PTEC students who are quick to point out the large number of jobs in the skilled trades that exist and remain difficult to staff across the United States. While talk of a large skilled jobs gap may not come across as anything new to those who follow national politics or listen to popular speakers like Mike Rowe, to hear it coming from high school students is yet another breath of fresh air—courtesy of PTEC.

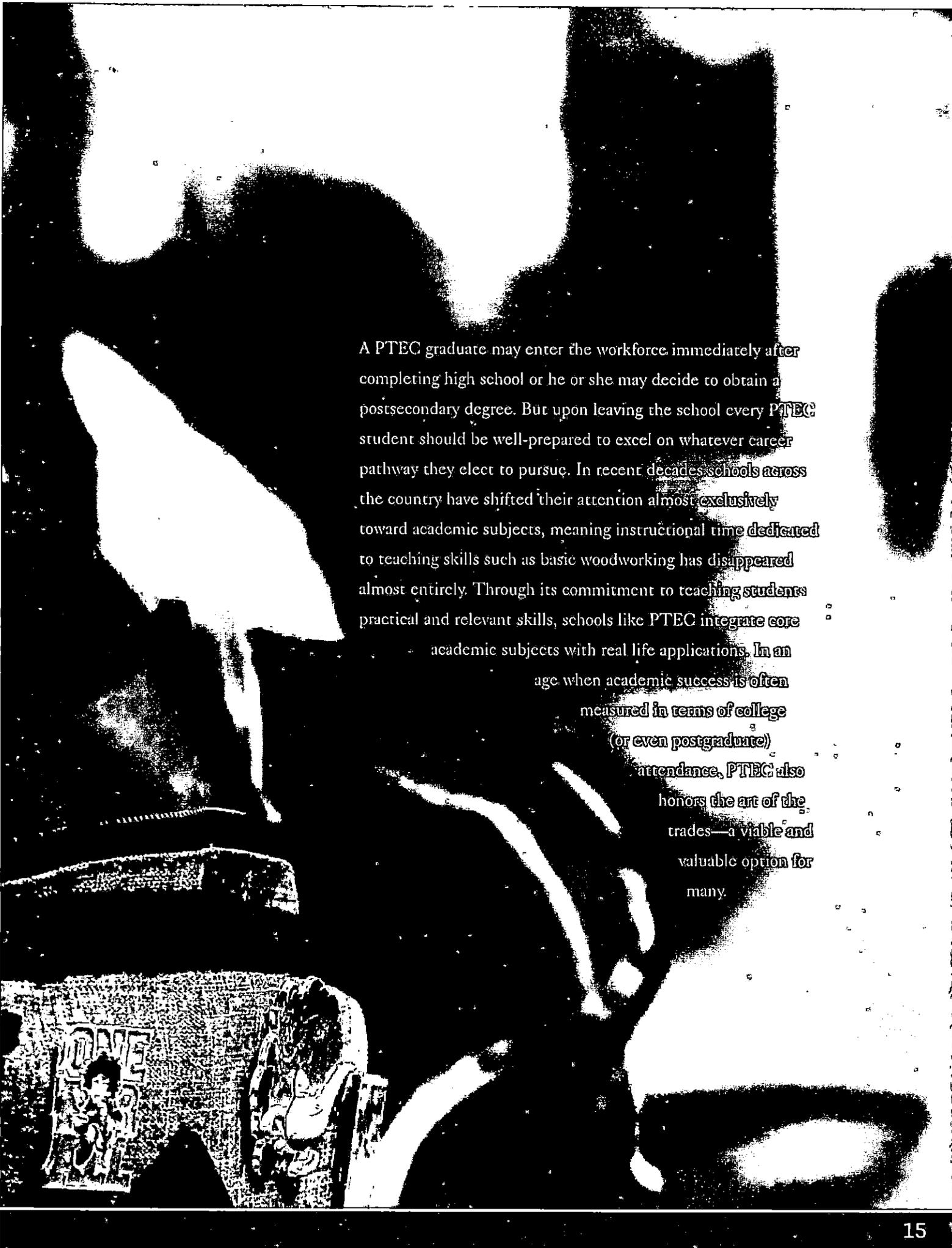
Though it isn't necessary for students anywhere to justify their educational choices by referring to national labor market trends, the fact that students like Reid can point to these figures goes far to suggest Power Technical students have thought about the value their education brings not only to their own lives but also on a social scale.

Some of these insights come from school while others are learned outside it. David, for example, works at a fast food restaurant and this experience has allowed him to better appreciate the value of PTEC's character program as he is quick to mention that the work ethic he sees in many of his coworkers would be considered unacceptable

at his school. This is yet another point attesting to the fact that what PTEC is doing seems to be working. Principal Daugherty is keen to stress that while the character education the school offers is valuable for the sake of helping students lead better and more fulfilling personal lives, it also has a very practical component: the school hopes to educate students who are not only academically qualified but are also more hireable than their competition.

Practical competency is only one part of what makes someone an employee worth hiring and retaining, the rest is less tangible but nonetheless remains teachable. All this starts with things which may seem small and to many teenaged students may appear pointless. The school has a relatively stringent tardiness and absence policy and its dress code is strictly observed. If a student does not wear his or her school issued shirt they are asked to wear a set of overalls. All of the character-related content is intended to instill in students a set of behaviors and attitudes that will make them even more attractive for employers than will their career training. Character education at PTEC, in other words, is career education and the two are inseparable.

This character training begins on the day when PTEC students step into the school for the first time. At many schools the first day might be dedicated to covering the behavioral and academic expectations and regulations. At PTEC this is taken up a notch as students learn their "yes, ma'am and yes, sir" and practice shaking hands. Daugherty also stresses that PTEC students are taught to make direct and deliberate eye contact with whomever they are meeting or speaking to. Students are also instructed how to ask follow-up questions or even how to properly engage in small talk, or to open doors. All this adds up and one day may wind up making the difference between getting a job and not getting it or being accepted or rejected by a college. Principal Daugherty believes if he and his staff create the expectation of certain behaviors, no matter how "pointless" or "dumb" they may appear to a twelve-year-old, these will turn into habits leading to future career success.



A PTEC graduate may enter the workforce immediately after completing high school or he or she may decide to obtain a postsecondary degree. But upon leaving the school every PTEC student should be well-prepared to excel on whatever career pathway they elect to pursue. In recent decades schools across the country have shifted their attention almost exclusively toward academic subjects, meaning instructional time dedicated to teaching skills such as basic woodworking has disappeared almost entirely. Through its commitment to teaching students practical and relevant skills, schools like PTEC integrate core academic subjects with real life applications. In an age when academic success is often measured in terms of college (or even postgraduate) attendance, PTEC also honors the art of the trades—a viable and valuable option for many.



Photos by William Lemon.



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