

# *Colorado Helps Advanced Manufacturing Program*

## *Pueblo Community College Case Study*

**Heather B. James  
Renée Edwards**

Released March 2016



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## INTRODUCTION

The Colorado Helps Advanced Manufacturing Program (CHAMP) is a United States Department of Labor (USDOL) Trade Adjustment Assistance Community College and Career Training (TAACCCT)-funded grant project intended to develop new or redesigned online and hybrid courses leading to credentials in advanced manufacturing in high demand fields across the state of Colorado. The Colorado schools involved in CHAMP are a consortium of eight of the state's community colleges and one four-year institution: Front Range Community College (FRCC), Pueblo Community College (PCC), Red Rocks Community College (RRCC), Lamar Community College (LCC), Pikes Peak Community College (PPCC), Aims Community College (Aims), Community College of Denver (CCD), Emily Griffith Technical College (EGTC), and the Metropolitan State University of Denver (MSU Denver).

Prior to the development of CHAMP, the Colorado Advanced Manufacturing Alliance identified two gaps in the state's existing academic training programs that had been previously designed to meet the needs of the industry: 1) the lack of a consistent voice representing the needs of industry to the academic community and 2) the absence of a strong network to facilitate business-to-business activity partnerships with educational institutions. The CHAMP project was conceived to address these issues with the larger goal of making Denver and the state of Colorado a leading advanced manufacturing hub.

CHAMP is in place to increase the attainment of degrees and certifications in manufacturing in order to best serve employers' needs. In service of the market-oriented end of this goal, its programs are designed to produce 21st-century workers whose skills align to local market trends—community colleges work with local employers to align their programs with industry-recognized skills and competencies. With regard to increasing the number of graduates entering the market, CHAMP is focused on creating innovative and flexible learning opportunities for students. The grant calls for schools' existing courses to be adapted for hybrid delivery, for example, such that a portion of the traditional face-to-face instruction is replaced by web-based, online learning.

In addition to designing or redesigning advanced manufacturing programs to fit a hybrid model, each college is required to integrate open education resources (OER) into its CHAMP curriculum. OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and repurposing by others. OER may take the form of full courses, course materials, modules, textbooks, streaming videos, tests, software, or any other tools, materials, or techniques used to support access to knowledge. Under the CHAMP grant, consortium colleges are encouraged to use OER in the creation or redesign of online or hybrid courses and are also required to create or redesign their courses and programs such that they can be packaged and licensed as OER for use by other educators and institutions. Thus, staff at CHAMP colleges will package, license, and post their course materials during the course of the grant.

Each college in the consortium is also required to employ at least one CHAMP navigator to collaborate with employer–partners, local workforce centers, community and nonprofit organizations, and students to ensure students’ access to CHAMP resources and facilitate their success. Within each of these areas of collaboration, navigators work according to their institution’s needs to build CHAMP programs, recruit and retain students for CHAMP programs, and assist those students as necessary. Navigators track their interactions with CHAMP students to report outcomes based on a model of *intensive advising*, which involves multiple interactions and points of intervention with each student throughout his or her education to ensure each student’s success and, ultimately, employment.

Aside from these institution-specific innovations, consortium-level outputs are also to be integrated within each college. These include massive open education courses (MOOCs) and a new credit-for-prior-learning process. Three MOOCs were created at the consortium level: a math MOOC, a student success/employability MOOC, and a credit-for-prior-learning MOOC. Each college is encouraged to include one or more of the MOOCs in its program or institutional curriculum. The process at each college for awarding students credit for prior learning will also be redesigned at each college according to policies developed by the consortium.

This report is one of nine created to highlight each individual college’s contributions to the CHAMP project at year two of the grant. The purpose of this case study is to identify the implementation processes utilized by PCC and to provide a summary of the PCC CHAMP team’s activities, successes, and challenges to date. This case study begins with an overview of its methodology and data sources and then moves on to the contextual frame – demographic and socioeconomic background information about PCC, its student population, and its service region. These sections are followed by a summary of the goals of PCC’s CHAMP program; a discussion of the implementation of the program, including the design process and its incorporation of OER; a look at student and faculty perceptions of the program; an examination of employer and workforce center collaborations; a discussion of the CHAMP navigator position as it has developed at PCC; an examination of the college’s approach to redesigning its credit-for-prior-learning options and processes; and a summary of successes, challenges to date, and recommendations for next steps.

## **METHODOLOGY/DATA SOURCES**

This report examines the development and implementation of the first two years of the CHAMP grant at PCC, including experiences of the project team members and participating staff, faculty, and students. As such, this report uses qualitative data and analysis. Subsequent EERC evaluation reports will include outcome measures and report on quantitative data collection and analysis.

The qualitative methodology for this report includes content analysis of consortium goals and activities to date, relevant proposals, and project- and college-specific statements of work, quarterly reports, and websites developed by individual colleges. EERC team members also conducted phone and in-person interviews with college project leads, staff, faculty, navigators, and students.

Most interviews were taped and transcribed; non-taped interviews involved extensive note taking. These transcriptions and notes as well as the documents cited above have been coded through the use of NVivo qualitative data management software and analyzed by EERC team members to represent each college's individual story relative to the CHAMP project.

As noted above, while quantitative analysis will be presented in subsequent reports, this summary is meant for contextual purposes only and will only utilize data from qualitative analysis. For this reason, grant targets relative to each college, student counts, course counts, industry- and workforce-related targets, and other quantitative objectives will not be discussed as part of this report.

## **COLLEGE DESCRIPTION AND OVERVIEW OF STUDENT POPULATION**

Established in 1933, PCC is a multi-campus, nonresidential college with its main campus in Pueblo, Colorado. PCC also maintains the Fremont campus in Cañon City and a division called Southwest Colorado Community College (SCCC) with sites in Durango and Mancos. The latter were established in 2009 when PCC merged with San Juan Basin Technical College. PCC has a broad reach, serving students in two distinct parts of Colorado.

PCC is a two-year community college within the Colorado Community Colleges System (CCCS), offering more than 50 associate's degree programs and over 150 career and technical certificate programs and preparing students for transfer to four-year colleges. PCC prides itself as a leader in manufacturing, machining and welding education. Colorado has a long industrial tradition and, despite national trends in manufacturing, the need for welding and machining professionals is growing in the state.

During the 2013-2014 academic year, PCC served 2,521 full-time and 4,197 part-time students.<sup>1</sup> The majority of PCC students were female (about 55 percent), and slightly over half of the student population was considered "non-traditional;" 25 years or older (52 percent).<sup>2</sup> The ethnic distribution of the local population is quite diverse. Pueblo is home to the largest Hispanic population in Colorado (50 percent).<sup>3</sup> PCC is designated as a Hispanic-serving institution by the U.S. Department of Education. Although the main campus of PCC is located in Pueblo, considered an urban area, the rest of the PCC's service region PCC is considered rural. These communities are located in the central area and the most southwestern corner of Colorado. To better serve the education needs of a large rural population, PCC offers online and hybrid programs. In addition to its own online programs, PCC uses

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1 Community Colleges: Pueblo Community College. (n.d.). Retrieved November 15, 2015, from U.S. News & World Report: <http://www.usnews.com/education/community-colleges/pueblo-community-college-CC06991>

2 Community Colleges: Pueblo Community College. (n.d.). Retrieved November 15, 2015, from U.S. News & World Report: <http://www.usnews.com/education/community-colleges/pueblo-community-college-CC06991>

3 State and County Quick Facts. (2014, July 8). Retrieved August 12, 2014, from the Bureau of Labor Statistics: <http://quickfacts.census.gov/qfd/states/08/0862000.html>, <http://quickfacts.census.gov/qfd/states/08/08101.html>

the CCCOnline educational resource shared by all members of CCCS.

## **PCC'S CHAMP GOALS**

PCC's many CHAMP goals work together to increase student connection to the local labor market. The school's first project lead (there have been two throughout the course of the grant to date) noted that PCC saw an opportunity to expand its manufacturing programs to meet an increasing return of employment opportunities in the industry. "[PCC] has a long, distinguished history of... advanced manufacturing, in the trade areas of welding, electro-mechanical, and machining," he noted. Returning jobs required new skill levels and "new expectations." PCC staff saw CHAMP as an opportunity to 'tweak' programs and work with industries to design cutting edge curriculum. Additionally, staff at the college saw CHAMP as an opportunity to transition more courses to a hybrid format—allowing students increased flexibility, as well as to "fast track" programs allowing students to learn skills and find job placement faster than traditionally possible.

At the start of the grant term in 2013, PCC launched an ambitious plan including four specific program goals: 1) create and implement a soft-skills oriented production technician certificate program to stack with other programs, 2) enhance and fast track the welding technology certificate program and add employer-driven content, 3) enhance the electromechanical technology certificate program, and 4) enhance the machining technology program. Grant staff were hoping to develop fast-track programs for electromechanical and computer numerical control (CNC) throughout the grant process as well. PCC also planned to hire an instructional designer to prepare courses for online and hybrid delivery of all four programs. Keeping with broader CHAMP consortium goals, PCC planned to leverage the grant to strengthen industry and employer relationships, recruit new students into the newly expanded programs, and institutionalize and expand credit for prior learning opportunities for students. The following four sections describe each program in detail relative to the program's career path, labor market need, and overall program goals.

### **Production technician certificate program**

At the time this case study was written (winter 2015), the production technician certificate program remained in the design phase with implementation planned for the near future. Although college staff planned the program as one of the primary goals of the grant, the project lead believes a simple typo in the grant proposal led to the elimination of the program in PCC's implementation plan. The program is written in as one of PPCC's program goals instead of PCC's—the addition of one "P" in the proposal likely caused the error. Regardless, project staff members still plan to implement the program. PCC is involved in the Pueblo Manufacturing Sectoral Collaboration (PMSC), which includes 25 manufacturers as well as governmental and educational institutions to increase the technical and professional skills of the region's manufacturing workforce. Partly through involvement in this group, PCC noticed a need to increase soft skills to boost job readiness. As such, PCC plans to add the production technician assistant certification to its course mapping. Students will be

encouraged to obtain soft skills first and then stack this certificate with other manufacturing certificates or degree work. Though students might be inclined to skip this credential, the navigator will help inspire new enrollees to start with the basics. CHAMP staff members note that when employers realize that graduates have the necessary soft skills to participate successfully in a professional setting, they are more inclined to offer internships and work with the college in future hiring decisions. According to PCC's current project lead, they are willing to bring the program on because "industry partners really want it."

### **Fast-Track welding technology certificate program**

The traditional welding program has a long and successful history at PCC, and that tradition continues with the fast-track program. Fast tracking is a direct response to a local labor market shortage: too few young people choose careers in welding and older welders continue to near retirement age. According to the USDOL, "there were 337,300 jobs for welders, cutters, solderers and brass workers in 2010. By 2020 that number is expected to have grown 15 percent."<sup>4</sup> Replacement rate concerns are especially pertinent to Colorado due to the return of manufacturing jobs.

Fast-track welding takes curricula from two or three semesters of individual welding processes and positions and intensifies the schedule. In one semester, students work four hours a day, four days a week. When the semester ends, they've mastered the welding basics and are ready for an AWS certification and employment. At the time this case study was written, the fast-track welding program was up and running at PCC. The swift implementation of this program is a point of pride for CHAMP staff. Beyond labor market matching, fast-track welding also meets the needs and interest of students. Noting "welding has fire," one CHAMP administrator highlighted the strong interest of students in both traditional and fast-track welding as well as the complementary nature of the two programs. Additionally, according to a 2014 Bureau of Labor and Statistics (BLS) report, the median wage for a welder is \$17.99 nationally. However, in Colorado, BLS reports that the median wage for a welder is \$19.40.<sup>5</sup> This highlights the value of this career path for state residents.

### **Electromechanical technology certificate program**

The electromechanical technology field is a growing subsector of advanced manufacturing with strong median annual wages of \$51,820 in 2012 and projected employment growth of four percent from 2012 to 2022.<sup>6</sup> Since electromechanical technicians are generalists in technology, their broad skill set will help sustain demand for their services. Enhancement of the electromechanical technology certificate

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<sup>4</sup> USA Today (2012). Shortage of welders sparks interest in training. Retrieved on December 17, 2015 from: <http://www.usatoday.com/story/money/business/2012/10/21/welders-shortage/1641073/>

<sup>5</sup> Bureau of Labor and Statistics. (May 2014). May 2014 State Occupational Employment and Wage Estimates Colorado. Retrieved on January 2, 2016 from: [http://www.bls.gov/oes/current/oes\\_co.htm](http://www.bls.gov/oes/current/oes_co.htm)

<sup>6</sup> Bureau of Labor and Statistics. (n.d.) Retrieved on November 25, 2015 from: <http://www.bls.gov/ooh/architecture-and-engineering/electro-mechanical-technicians.htm>

program is “off to a reasonable start” according to PCC CHAMP staff. At the time this case study was written, portions of the 28-hour certificate program were enhanced or in the process of being enhanced to include hybrid courses.

### **Machining technology program**

Machining is on the rise in Colorado and Pueblo with a need for more skilled workers. Commenting on the value of CHAMP’s advanced manufacturing programs, the precision manufacturing technology program director told BizWest:

The average machinist makes \$39,600 annually, according to the Bureau of Labor Statistics...but top machinists can make from \$80,000 to \$90,000 annually. There’s a shortage [of workers] and companies are competing for talent. You can write your own ticket, and many machinists do.<sup>7</sup>

TAACCCT round three required grantees to demonstrate local labor market need for enhanced training, and PCC has proven itself aligned to this objective. At PCC, CHAMP works as a localized response to employer needs facilitated by the college's deep roots in the community.

PCC’s existing machining program provided stackable credit opportunities including an inspection certificate, manual machining certificate, and an associate’s degree in advanced metal working using computer controlled machines. The machining program combines the basics of ‘old school’ manufacturing with newer high-demand skills including Mastercam and the use of computer-aided manufacturing software. At the time this case study was written, parts of the machining program had been enhanced to include hybrid classes. CHAMP staff noted that the grant offers an opportunity for experimentation to find the best mix of online and face-to-face instruction. Faculty, administration, and the instructional designer continue to work together to find the best formula for success in hybrid teaching in the machining program.

While the last decade saw severe manufacturing job losses in the U.S., advanced manufacturing is returning to Colorado. A state-wide trend, manufacturing increases are specifically important to Pueblo. Post-recession, the area continues to face economic challenges. Though the unemployment rate in Pueblo has declined to about 6 percent in 2015, it remains higher than the national average.<sup>8</sup> Further, manufacturing employs about 11percent of workers in Pueblo, mostly in primary metal manufacturing/fabrication, but also in other sub-sectors such as the production of aircraft brakes, cement, climate control systems, chemicals, plastic pipe and others.<sup>9</sup> Manufacturing is an “economic

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<sup>7</sup> Grants Help Advanced-Manufacturing Training Gear Up. (February 2015). Retrieved on November 11, 2015 from: <http://bizwest.com/grants-help-advanced-manufacturing-training-gear-up/?refresh=1>.

<sup>8</sup> Bureau of Labor and Statistics. (2015). Economy at a Glance Pueblo, CO. Retrieved on November 11, 2015 from [http://www.bls.gov/eag/eag.co\\_pueblo\\_msa.htm](http://www.bls.gov/eag/eag.co_pueblo_msa.htm)

<sup>9</sup> School of Management and Labor Relations. (2013). Colorado SECTORS Initiative: Pueblo Manufacturing

driver” in Pueblo where roughly 15 percent of local earnings stem from the occupation. Additionally, manufacturing “has a 1.33 to 1 'multiplier' effect in terms of overall economic impact to the area.”<sup>10</sup> In addition to a projected increase in demand for advanced manufacturing skill sets, the BLS projects long-term manufacturing growth in their 2014 to 2021 forecast.<sup>11</sup> Further, according to the Colorado occupational employment statistics wage survey, all advanced manufacturing jobs pay more, on average, than the Pueblo median hourly wage of \$18.47.<sup>12</sup> Given the importance of manufacturing to the Colorado and Pueblo economy, the expansion of welding, machining, and industrial electronics provides students with access to high-demand jobs and high-wage opportunities.

## **IMPLEMENTATION**

PCC’s implementation of its CHAMP goals is a result of staff dedication and high degree of responsiveness to internal challenges. In a relatively short period of time, PCC had two different project leads and two different navigators working on behalf of the grant. Staff adapted quickly to the ever-evolving environment, often filling multiple roles during transition periods. Staff members continue to work to bring faculty on board with the online elements of the CHAMP program and to institutionalize hybrid teaching methods.

### **Design/Redesign Process**

The sections below review implementation successes and challenges associated with each program as well as the larger hybridization initiative associated with PCC’s CHAMP programs.

#### **Production Technician Certificate Program**

Although it has not been implemented yet, one CHAMP staff member noted “the reason [that this program is] important [to develop] is [because] it's based on...success skills...on the soft skill side that are very important...for a good number of folks in our target groups.” The program in design will likely include employer expectations, technology skills, and mechanical math “to help [students] not only initially get a job, but to succeed once they're there.” Although confusion at the writing of the

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Collaboration. Available from: <http://www.sectorssummit.com/wp-content/uploads/2013/04/Pueblo-Manufacturing-Collaboration.pdf>

<sup>10</sup> School of Management and Labor Relations. (2013). Colorado SECTORS Initiative: Pueblo Manufacturing Collaboration. Available from: <http://www.sectorssummit.com/wp-content/uploads/2013/04/Pueblo-Manufacturing-Collaboration.pdf>

<sup>11</sup> School of Management and Labor Relations. (2013). Colorado SECTORS Initiative: Pueblo Manufacturing Collaboration. Available from: <http://www.sectorssummit.com/wp-content/uploads/2013/04/Pueblo-Manufacturing-Collaboration.pdf>

<sup>12</sup> Colorado Department of Labor and Employment (2012). Occupational Employment Statistics Wage Survey. Retrieved on November 11, 2015 from:

<https://www.colmigateway.com/admin/gsipub/htmlarea/uploads/OESWageSurvey2012.pdf>

grant proposal delayed implementation, staff has a strong commitment to the future creation of this program. This is evidentiary of the college's commitment to meeting the current needs of local employers and students.

### **Fast-track welding**

PCC's fast-track multi-process welding program, which is up and running in addition to the traditional welding program, represents a major structural change to the traditional teaching model and is designed to expedite entry into the labor market. Multiple CHAMP staff members mentioned the success of the fast-track welding program. CHAMP staff were proud of the swift implementation of this new track and robust student interest. One staff member further noted that welding has been relatively quick to embrace hybridization as a key part of fast tracking. She added that the instructional designer worked "day and night, really, to get that done" - meaning to keep pace with the development of the online components of the new fast-track program and to get the program ready for roll-out. Fast-tracking requires a nuanced program design and operation model to which students, faculty, and administration were not accustomed. The ability to launch such a model within a short period of time illustrates PCC's commitment to leadership in the advanced manufacturing sector.

The college expects to build out this program and to continually screen students via the navigator role to ensure appropriate placement. In fact, the need for pre-placement advising is a key promising practice that has derived from the success of fast track welding. Several CHAMP staff members emphasized the need for screening. Not all students are ready for the fast pace of the program. Some are not prepared to devote themselves to large blocks of time in the college environment that is required by fast track. Some are worried about the online components. Discussions with the navigator help channel students into the program (fast-track or traditional) that best matches their time-constraints and abilities and curtails drop out.

While fast-track was conceptualized as a vehicle for swift labor market entry, some program graduates have expressed interest in further welding education. Fast-track welding can be a final stop for those seeking immediate employment or an entryway that helps break down student discomfort with the school environment. For students who intend to go beyond fast-track welding, questions of equivalency present a barrier that administrators are working hard to surmount. The courses do not have one-to-one equivalency, and while the programs are cumulatively equivalent, the traditional program contains four additional credits beyond the fast-track program. Some faculty members are skeptical regarding the equivalency of fast-track welding to the traditional program, thus further questioning the transferability of the courses. Currently, a proposal has been made to allow students that wish to continue their education in the welding associate's degree program to transfer in with their fast-track completion, pass their AWS qualification test, and pay for the additional credit hours. Essentially the students would go through a process similar to credit for prior learning. CHAMP staff are awaiting approval from PCC administrators for the current graduating class and will re-visit the

issue again next semester. This challenge requires ongoing dialogue between administration and faculty but has been taken in stride by CHAMP staff. One administrator best summarized this challenge stating, “Students want to continue [their education]...I’d love to have more problems like this.”

### **Electromechanical technology certificate program**

The electromechanical technology certificate program emphasizes a broad range of skills including print reading, motors and controls, and mechanical components with articulation opportunities possible in a variety of engineering fields. The program is very desirable to employers, and workforce centers continue to encourage participation. However, enrollment has proven a challenge. CHAMP staff members remarked that electromechanical is hard to visualize; it’s difficult to create an appealing mental picture for students. While students can “picture” what welding is and what machining is, they have more difficulty understanding what electromechanical “looks like.”

The electromechanical program ordered new equipment for the hands-on learning portions of the program. The equipment was delivered disassembled, which allowed assembly and disassembly to become part of the actual course curricula. Students assemble the equipment at the beginning of the program and disassemble them at the end. Previously, this skill had to be learned by students on the job.

The electromechanical technology certificate program found some success in early hybrid course development with one class already running partially online in August of 2014. This course was newly added by PCC at the start of the grant and was originally designed in a hybrid format. However, there was confusion among faculty with regard to hybridization. Some faculty believed that the redesign of the program only involved the addition of the new courses, not the redesign of the entire program into a hybrid format. In addition, some faculty members did not understand the definition of hybrid— not realizing it meant converting elements of the courses to an online format. Further conversations with faculty have helped correct this initial confusion, but resistance among some faculty still remains. Both the project lead and instructional designer mentioned a newly hired instructor who is committed to hybrid courses and who has helped develop two new classes to be launched in the fall (of 2015). This suggests that PCC may want to consider faculty comfort with online teaching as part of the hiring process and may need to invest in additional professional development in this area. For the most part, electromechanical technology courses are running “web-enhanced,” and, although staff and some faculty are still trying to encourage resistant faculty members to embrace hybridization, the process has been slow. Additionally, CHAMP staff originally hoped to create a fast-track option for electromechanical students, but some faculty members have been resistant to speeding up the process, feeling that face-to-face instruction and class time are too important to students’ success in the program.

## **Machining**

The machining technology program is a multi-layered plan of study with four stackable certification options requiring three semesters of study. Students can also complete a 73-credit associate's degree in machining technology. Prior to CHAMP, the machining program existed in a basic format with stackable certificates in CNC and computer aided design and manufacturing (CAD/CAM). CHAMP staff note that the basic machining program will "get you in the door" but CNC and CAD/CAM are much more advanced. According to one staff member, changes to this program were less structural than in welding and more about 'tweaking' the program to add emphasis on higher-skilled, higher-paid machining skills. The upgraded program offers an inspection certification option after the CNC certification. This certificate is the highest machining certificate offered at PCC and allows students to do quality control. All of these programs can stand alone, but students now have the option to obtain advanced certification. The program may also be more attractive to those with prior manufacturing experience that need to upgrade and adjust their skills to a new, technology-oriented labor market.

PCC's machining program was well poised to implement CHAMP goals because of its pre-existing ties to the local labor market. Many PCC faculty members have worked, or are currently working in, the local machining field, including manufacturing facilities that hire PCC students. Additionally, as a part of CHAMP, all faculty members obtained the National Institute for Metalworking Skills (NIMS) accreditation. This credentialing allows faculty to certify students in-house after completion of the redesigned curriculum. This eliminates the time and cost of students going elsewhere for industry credentialing.

Industry need for machining employees is high; however, students are not enrolling in the program at a rate to match the industry need. Faculty members in the program commented that students are "afraid of math" and that "precision is scary" when it comes to precision machining. It was also noted that many students are seeking a trade skill, and welding is a popular option. Many do not understand that machining is a valid option for a professional skill. PCC is acutely aware of the mismatch between student enrollment and statewide job growth and is seeking solutions to make the program more attractive to students.

Given the long experience of PCC's machining faculty with traditional teaching methods, this program has been particularly resistant to hybridization. In fact, courses that were redesigned to hybrid format were later modified to "web-enhanced" after the first semester as a result of faculty consternation over the loss of 'face time.' Faculty were willing to make concessions that include linking YouTube videos to class lecture material and offering optional internet resources to students, but felt the hybrid format went too far and reduced traditional instruction time too much. As with the electromechanical program, instructor willingness has a huge impact on the success and continuation of hybrid courses. It is also important to note that because CHAMP's timeline is quite condensed, some machining faculty members were introduced to the concept of hybrid teaching immediately prior to the start of their course, and many had never worked with hybrid formats previously; a

degree of opposition is to be expected in this circumstance.

PCC also planned a fast-track CNC certificate for the machining program, which is currently on hold. While several staff mentioned this program, a pathway for future implementation has not been clearly outlined. Similar to the electromechanical program, some faculty members are concerned that speeding the program up will decrease classroom/shop time too much, possibly creating an unsafe environment for students.

All three CHAMP programs are being prepared for hybrid delivery and are in varied stages of development, though faculty opposition is a consistent stumbling block. Hybrid delivery requires a complete change to the usual pedagogical model and can be quite complex when instructors are accustomed to hands-on content delivery. PCC's first project lead was especially proud of PCC's ability to attract a skilled instructional designer who obtained faculty buy-in around the move to online platforms. He noted that the instructional designer's approach has been very non-threatening, which has helped faculty see the advantages of online delivery. Still, institutionalization and post-CHAMP sustainability are concerns. The instructional designer has expressed concern that some newly redesigned programs may transition to simply "web-enhanced," with limited online elements, once CHAMP concludes. Machining and electromechanical require hands-on learning, to which instructors are very dedicated. Still, one instructor noted that, "the more I am involved in working with [the instructional designer] the more I like it...our program is very successful." Another faculty member commented on the strength of the instructional designer stating, "she makes the process comfortable...we talk with her and work with her." One faculty member admitted he was previously very resistant to the idea of putting anything online, but with the instructional designer's hard work and patience, he can now "really see what the benefits are."

Instructors exhibit a high degree of knowledge about their class participants and note that many have full time jobs and financial constraints. Initially, they expressed concern that some students could be overwhelmed by content administered without one-on-one help. Additionally, one faculty member worries about students' ability to afford the computer equipment necessary for hybrid coursework. However, faculty members also mentioned that female machinists were especially drawn to the hybrid format. Given the need for more employees in the Colorado machining industry and the lack of women overall, hybrid courses might be used as a selling point for non-traditional machining students in the future. Hybrid courses are more flexible and potentially more attractive to women who are more likely to be the primary caretakers of children.

To help address faculty fears regarding a lack of one-on-one instruction, students are also receiving individualized assistance with the online components of the program from the instructional designer, the navigator and others. While computer challenges were expected for those students changing careers—many of them older—CHAMP staff found that younger enrollees were also lacking in computer skills. Significant time investment has been necessary to familiarize students with online platforms. The current navigator decided to open a computer support lab once a week so that students

could practice their skills. Still, design enhancements continue to strengthen and simplify the student user experience. Often, such design changes occur over the course of several semesters with feedback from instructional designers and subject matter experts prior to the launch of the course. PCC has not had this luxury and is working well despite “building the airplane and flying it at the same time.”

PCC’s first project lead noted that the desire to create hybrid curriculum that was up to national standards—despite a short timeline for roll out—encouraged them to put intense effort into program design. Despite this sincere effort, the instructional designer and administrators spoke at some length about institutionalization concerns and the challenges of obtaining faculty buy-in. Those frequently in contact with students, such as faculty members and the navigator, were also surprised at the students’ lack of comfort with online platforms. The ability to use technology is quintessential to success in modern, advanced manufacturing. PCC is providing a great service to its students when it invests extra hours in their computer learning. Like all professionals, faculty will likely eventually adapt to changing workforce models. PCC’s current struggles are likely to have immense long-term payoff for students, the local workforce, and the college.

### **Open Educational Resources**

The CHAMP instructional designer had been instrumental in assisting faculty members in using and creating OER curriculum. Additionally, in many cases, faculty members were not trained in using Desire2Learn (D2L), PCC’s learning platform, prior to CHAMP. The instructional designer not only taught faculty how to use the platform, but also helped them build completely new curriculum to be licensed OER. She reported that mostly faculty have created their own material rather than search for material on SkillsCommons (the open education repository) because the process was very time consuming and tedious. She has found some resources through SkillsCommons and has prepared it for faculty use herself. Occasionally, she said, “you can find some really good things on there,” but it’s time consuming and faculty just do not have the time.

There have been some challenges in creating courses to have 80 percent OER content, since many elements of courses rely on copyrighted equipment/materials. Additionally, most faculty members were relying heavily on copyrighted textbooks for teaching, which have had to be replaced. The process had been a huge learning curve for faculty, many of whom are trained as professional machinists or welders, not teachers.

### **STUDENT PERCEPTIONS OF PROGRAMS**

Student comments about the newly redesigned CHAMP programs were overall positive. One student commented that the fast-track welding program was allowing him to “get in, get out, and get a job” which is “exactly what school should do.” Other students echoed this, stating that the ability to receive an education so closely paired with a career path was what attracted him to the program. Students seemed especially happy with new equipment funded by CHAMP stating, “[our] shop

equipment is exceptional. Our shop is as close to industry as it could be. It [provides a] very good learning environment and is up to date." Students believe that CHAMP programs "exceed expectations" and that enrollment challenges will not be an issue once the community becomes more aware of the stellar training opportunities available. One student said, "CHAMP can help us the spread the word for machining...we need to let community know that after you get your education here you can work locally and nationwide."

Some students are having difficulty with the online portions of the redesigned programs. Some faculty perceive that the "web enhanced" courses are not received well by the students. Faculty stated that this seems to be mostly exacerbated by poor computer skills. The idea of typing or accessing online coursework from home was not well received by some students.

## **FACULTY PERCEPTIONS OF PROGRAMS**

Regardless of some faculty's resistance to fast-tracking the electromechanical and CNC portion of the machining programs, and some continued resistance to hybridizing courses, faculty are extremely positive about some elements of the programs' redesigns. Faculty highlight the advantage of CHAMP's screening process for welding fast-track students in which the navigator meets with students to assess their readiness for a time-intensive program. Additionally, the navigator is meeting with students prior to their entry in the machining and electromechanical programs, to make sure the programs are a good fit and to assess any needs students may have, such as transportation or childcare. Faculty are also extremely pleased with the placement activities that have been implemented under CHAMP. Career readiness skills, mock interviews, and résumé readiness were all mentioned by faculty as positive elements of the programs. One faculty member noted that, "the whole [college] needs to follow [the] CHAMP model because it is very successful" with regard to student advising and the role of the navigator in placing students in appropriate programs, as well as job placement after the programs are complete.

Faculty members also responded positively to the idea of a production technician certificate program, mostly because incorporating soft skills into courses is seen as highly valuable to them. Because the program is not yet running, faculty are trying to incorporate soft skills into their classes by including participation as part of student grades and by deducting points for lateness. They are also embedding soft skills into their curriculum, focusing on career readiness for students in addition to their technical skills.

## **EMPLOYER AND WORKFORCE CENTER COLLABORATION**

PCC's employer collaboration initiative began with the appointment of a new project lead in the middle of 2014. The project lead boasts a 30-year manufacturing background and brought strong industry connections. When asked about her prior experience, she highlighted her manufacturing credentials quipping, "I made potato chips." When speaking about his transition out of the project

lead role, the former project lead was especially encouraged by the new lead's longtime experience in manufacturing. He noted she "speaks the language" of the manufacturing business and makes an excellent liaison to the manufacturing community.

In addition to these connections, PCC has a strong relationship with its local workforce center. These existed prior to the grant but are being strengthened to create closer ties to the manufacturing industry. A CHAMP staff member noted that the college typically works with individual contacts at the workforce center to facilitate meetings with industry representatives. PCC utilizes its relationship with the center to speed connection to employers. A representative from the workforce center assists with student employment, taking student résumés from the navigator and distributing them to local employers. He also meets regularly with CHAMP staff and helps them understand employer needs.

CHAMP outreach also complements PCC's existing work with professionals in this sector and strengthens the overall notoriety and credibility of the college. Outside CHAMP, PCC is working collaboratively with the workforce center to actively dialogue with six of Pueblo's largest manufacturing employers and continues to reach out to approximately 30 other smaller employers in the region to identify gaps in Southern Colorado's manufacturing workers. PCC is very aware of the value of employer input. Previous employer feedback resulted in 565 hours of curricula in advanced manufacturing skills taught in mobile learning labs. The labs (originally funded through a TAACCCT round one grant) are part of Pueblo Corporate College, a self-sustaining division within PCC. One CHAMP program staff member noted some of the mission overlap of this division and the CHAMP program and planned to work more collaboratively with them in the future. Currently, CHAMP staff is working to engage more employers directly, rather than always engaging through the workforce center as a liaison. Employer outreach is needed both to increase internship offerings and to assist with student placement. The new navigator also noted the need for outreach and placement beyond the immediate area; for example, with employers in Denver and Greeley, or "wherever the jobs are." PCC's CHAMP outreach strategy derives from the college's deep knowledge of the labor market, including the location of jobs available during any given semester.

The drive toward hybridization should also help PCC connect students to employers. During a site visit to a local employer, one industry representative commented that they had recently placed all job applications online and no longer accept paper applicants. While faculty were initially resistant to hybrid coursework partly because of students' poor computer abilities, this employer comment is illustrative of the necessity of computer skills in the 21st-century workforce. A potential employee could not even apply to work for one partner employer without computer skills. Modern workforce retraining and placement has a technology component no matter the field.

## **Internships**

PCC's electromechanical program stands out as a model of internship success. Employers are aware of the program's existence; one actually approached PCC to create an internship program within its

company. In addition, several employers have identified their interest in setting up internships for PCC's electromechanical students. This relationship is important since employers often want employees with some experience on the shop floor. PCC is working to secure new Memorandums of Understanding to facilitate the institutionalization of these internships.

Internships for PCC's certificate programs in welding and machining are more difficult to secure. This is a result of the high injury risk rate associated with these occupations as well as the high costs of the equipment and materials that would be trusted to an intern. This poses a financial risk to the company if an intern does not execute a job properly. Employers in these two fields have so far been reticent about bringing on interns. However, the CHAMP program is developing trusting relationships with employers and has seen some movement in the right direction. One employer "came around" after several interactions with high quality students from the PCC program. PCC program staff credit this turn around to participation in advisory boards and employer input into curriculum development. Still, a site visit identified one employer who was unaware of PCC's internship program. This underlies the need for the more expansive outreach in which the new project lead and navigator are engaged.

## **NAVIGATOR**

As mentioned previously, PCC has had three navigators to date. The current CHAMP project lead was previously the navigator, and when she transitioned to the project lead role the position was opened for a new navigator. The current navigator had recently been hired, and was still adjusting to her new position at the time of the EERC site visit. The former navigator helped transition the new navigator into the role. This maintained consistency of grant implementation and prevented a huge loss of intuitional knowledge.

The navigator is "the collective tissue that's going to make that a lot of [students] stay with it and succeed" according to one CHAMP staff member. PCC is committed to seeing students through to program completion, and a dedicated navigator can be essential to that goal. To that end, several CHAMP staff expressed a desire to carve out an indispensable role for this position beyond the life of the CHAMP grant and to actually expand the reach of the navigator so that the office is involved in all Advanced Manufacturing programs.

## **Background/Current work**

The current navigator has a background in school counseling, curriculum education, and transitional education—working with military students and helping them transition educational and career paths. Her previous background has helped her in her role as navigator, as many of the elements of the job are similar. The navigator role has been multi-faceted at PCC. PCC's project lead sees the navigator primarily as an advising resource for students - monitoring students' progress and helping them stay on track, as well as to "kick them in the butt if necessary." With CHAMP programs recently launching,

the navigator currently plays a dual role as recruiter and advisor. She also works with the instructional designer to spend time with students one-on-one and help them with computer skills so they can be successful in their hybrid courses. The former navigator, now the project lead, has also played a critical role in recruitment and industry outreach and sees this continuing as part of the new navigator's role. The navigator has also visited classes to teach interview skills to students, including a course for former convicts as part of PCC's reentry education program.

### **Massive Online Open Courses**

One of the original goals for the newly hired navigator was to focus on the student success/employability MOOC and find a way to integrate it into CHAMP student's education. Because the navigator had only recently been hired at the time EERC staff members visited, she had not been able to do this yet. Currently, the navigator and the workforce representative share teaching responsibilities in a career skills class. The course is optional for students, but recommended for students looking to pursue a job in manufacturing. The navigator noted "working in the manufacturing business is a whole different world," in that the lingo is unique, and understanding the do's/don't of the workplace is critical. The class was not running the semester of the site visit (fall 2015), because the daytime scheduling of the course did not fit with working students' schedules. The navigator reported the course was going to be offered as a one-day Saturday course moving forward, offering more flexibility for working students. The navigator still hopes to focus on the employability MOOC in the future, and plans to integrate it into the career skills course, or perhaps add another course that she might teach in the future. The project lead mentioned CHAMP staff had originally wanted the MOOC to run as it was designed, online, and integrated into the online portion of the redesigned courses. However, since some faculty are resistant to any online portions in their courses, they have had to rethink this plan.

### **CREDIT FOR PRIOR LEARNING**

Historically, PCC's system of awarding credit for prior learning has been weak and un-systematic. With the system-wide adoption of new credit for prior learning policies under the CHAMP grant and the consortium-level creation of new policies and procedures, the college is looking forward to strengthening its system. Previous challenges have included no testing space for students and absence of systematic portfolio policies. To date, CHAMP staff have held several informational meetings with administrators at the college to help them understand the credit for prior learning changes, including a college forum, and several deans and directors meetings. Currently, PCC staff are discussing how implementation of the new credit for prior learning policies will occur at the school.

### **CONCLUSION**

Decreasing time to completion for students has been a major focus for PCC through CHAMP. Administrators and project staff are incredibly proud of the CHAMP fast-track welding program and

its ability to place students in good jobs after only 16 weeks of training. This program has been a crown achievement for the school. Challenges to date as well as other successes are discussed briefly below.

### **Challenges to Date**

Machining hybridization has been challenging with some courses returning to web-enhanced with time added or remaining hybrid with an extra week added. While additional time is the opposite of fast-tracking, supplementary time is helpful to inexperienced students who want to practice their skills in the lab. Ultimately, PCC's goal is to implement online-learning programs that are robust enough to prevent the need for extra lab time. This is happening through trial and error.

Another stumbling block has been declining enrollment in machining. This has resulted in the cutting of night classes giving students fewer options for after work. The college continues to work through the best methods for increasing enrollment and finding balance between hybrid lessons and open lab.

Working with resistant faculty has been very challenging for CHAMP staff. The original vision of the grant for PCC was to redesign all three programs to hybrid, with multiple elements of courses transitioning to an online format. All three programs were meant to have a fast-track certificate option, as well. Because of resistant faculty, only one program out of the three was able to be transitioned to fast-track, and many hybrid elements of courses have been converted to "web-enhanced," with significantly less course material transitioned to online. Most web-enhanced course elements are simply videos or short simulations that are watched during class time. Faculty have been resistant to decreasing any class time, feeling students need the supervision.

Teaching career readiness skills to students has also been challenging. CHAMP staff members feel those students who most need the help are the least willing to ask for it. Additionally, the current career skills course is optional, and many students who need it do not take it. Staff have suggested that faculty embed career and soft skills into their courses, but when faculty do this, staff report it is mostly by simply embedding short videos. While students watch the videos in class, no follow-up is done, and students do not actually learn the skills. Many students feel like they do not need the extra help, and often believe their interviewing and career readiness skills are stronger than they actually are. The CHAMP navigator is working to integrate more career readiness skills for students into their programs so students are ready for employment when they exit.

### **Successes/achievements to date**

PCC may be considered a model of receptiveness to industry feedback. Administrators note that the new project lead is "really good at getting industry input." This pays dividends, as professionals in PCC's network know that they "are turning out [a] quality product." Employers are overall very excited about the redesigned programs and are happy with the student graduates. They find them to be well-trained and highly skilled.

Administrators also credit CHAMP with creating a space for the college to reexamine its short-term certificates and design high quality fast-track programs that staff and employers can believe in. Fast-track welding is an excellent example of PCC's responsiveness to the changing local labor market. With high enrollment and successful hybridization, this new track has already placed students in relevant employment.

CHAMP staff have made incredible inroads with resistant faculty members, helping them to learn the D2L platform, understand the benefits of placing some course elements online, and understanding how accelerating programs can benefit students. The instructional designer has been indispensable in this process, assisting faculty with the design/redesign process as well as understanding and creating OER resources. She has also been instrumental in helping students develop computer skills and increase their confidence in tackling online curriculum.

The fast pace of the redesign process has been a tremendous accomplishment for CHAMP staff. Even through staff turnover, a strong, collaborative, team has emerged which has allowed the institution to try new ideas and create stronger programs for students. They continue to further refine and redesign the programs, as well as implement new elements that will create stronger training opportunities for students.

### **Next steps**

Important next steps include the creation of the Production Assistant Technician Certification as well as a more formal process for PLA. CHAMP staff members will also continue to address the challenges of reaching new students. Plans for this include creating new ways to market machining to young students, such as creating marketing material that "shows" machining in action. Expanding the use of the interactive career map is also a priority for PCC; one idea is to use laptops at career fairs and let people "play" with the map, experience different career paths while talking to an advisor or CHAMP staff. Aside from recruitment and outreach efforts for people looking for a new career, CHAMP staff are also planning to schedule incumbent worker training around the rotating shifts that are common at companies in Pueblo. This will help increase recruitment of incumbent workers as well.

In addition to boosting recruitment, CHAMP staff are planning to get "beyond the client list of the workforce center," and are concentrating on ways to increase direct contact with employers. This will decrease reliance on the workforce center representative and free him up for other collaborative efforts with CHAMP staff. Staff members feel direct contact makes sense and will help them receive more rapid input regarding available jobs, as well as regarding recently placed students and any successes/challenges employers are having with them.

Because of the ongoing resistance to hybridization CHAMP staff have encountered from some faculty members, plans are in the works for a "CHAMP check-in meeting" — a roundtable conversation — to

discuss sustainability of the programs. They hope to bring in faculty members (both from PCC and from other consortium colleges) to talk about the benefits of hybrid courses. Additionally, they hope to convince faculty to try speeding up the certificates by implementing machining and CNC fast-track certificate programs, as previously planned. Administrators at the college are perhaps more optimistic about this than CHAMP staff, but all parties are brainstorming ways to help faculty transition courses and speed up certificates. Program staff are concerned about sustainability, fearing that faculty will “go back” to the way the courses were taught prior to the grant period, and are trying everything they can to keep that from happening.

Future plans for CHAMP at PCC also include continuing to “tweak” and modify courses as they run. OER resources are continually added, and the instructional designer continues to work with faculty to transition more course material to online or “web enhanced” (depending on the instructor). As PCC continues to fulfill its mission to transform the lives of Colorado students, enrich communities, and strengthen the regional economy, CHAMP staff is excited to take key lessons and promising practices from the grant term and apply them to the future.