SOUTHERN OREGON
REGIONAL NEEDS ASSESSMENT

DECEMBER 2020
PREPARED BY DIALOGUES IN ACTION

SOESD
Southern Oregon Education Service District

SOUTHERN OREGON CTE

CCGA College and Career For All
A Service of Southern Oregon ESD

SOUTHERN OREGON STEM

dia*
*rethinking the development of people

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EXECUTIVE SUMMARY

INTRODUCTION

Southern Oregon's regional (Jackson, Josephine, and Klamath counties) Science, Technology, Engineering, and Math (STEM) Hub has been invited to build local capacity for STEM through a grant opportunity with Oregon Community Foundation (OCF). OCF's IGNITE grant seeks to ignite partnerships between business and education to advance opportunities for specific target populations in Career and Technical Education (CTE)-STEM: rural, low-income, students of color and girls.

To prepare for that opportunity, the Southern Oregon STEM Hub retained Dialogues in Action (DIA) to conduct a needs assessment. DIA developed an interview protocol and purposeful stratification, received input from the Guidance Group on valuable community members to interview, and interviewed a total of 34 individuals. Additionally, DIA conducted background data analysis on existing data on the region's employment and education pathways and outcomes. Finally, the data findings were presented to a group of community leaders, who workshopped them, elevated the most salient points, and contributed to a series of possible responses to the needs assessment.

The following report provides a clear picture of the region's employability and economic growth for high wage, high demand careers; available pathways and opportunities to increase access for target populations; and accessibility gaps and opportunities for industry and education to actively partner to strengthen pathways for target populations, leading to high wage, high demand jobs.

A PICTURE OF THE REGION'S DEMOGRAPHICS AND ECONOMIC PROSPECTS

The Southern Oregon STEM Hub serves Josephine, Jackson, and Klamath Counties, which includes 13 school districts and 8 percent of the state's school-aged population. Given the focus of the Oregon Community Foundation's IGNITE grant on rural students, girls, low-income, and students of color, this report starts with an understanding of the demographics and geography of the area.

The region is predominantly white (Non-Hispanic). The next largest ethnic groups are White (Hispanic),[1] followed by Multiracial, Asian, and Native American. Klamath County in particular has a large Native American population, primarily based around Chiloquin. The region has increased in population over the past decade, mostly in Jackson County. Poverty rates are above the national average of 13.1 percent. According to the University of Wisconsin's Population Health Institute, out of Oregon's 35 counties, SOESD's three counties are ranked at number 16 (Jackson), 33 (Josephine), and 35 (Klamath). Childhood poverty and crime rates for all three counties are above the state average. The region is also mostly rural or remote, with a few small urban/suburban hubs.

The qualitative data show that for the most part, residents are proud of the beauty, small town connections, and outdoor activities of their region. However, others share that there are challenges in attracting people to move to the region or convincing young people to stay.

In Jackson and Josephine Counties, the industries with 10% growth or more projected through 2029 include 16 healthcare occupations, 15 construction occupations, 10 manufacturing occupations, and 5 high tech occupations. The remaining occupations fit within business operations and human services. Most of the highest growth occupations require a bachelor's or associate's degree, with the exception of the roles of Farm Equipment Mechanic, Industrial Machinery

[1] as defined by the American Community Survey administered by the United States Census Bureau.

Mechanic, and Plumbers, among other trades. The occupation with the highest number of annual openings is truck drivers, followed closely by registered nurses.

In Klamath and Lake Counties, the industries with 10% growth or more projected through 2029 include 3 healthcare occupations, 3 construction occupations, 1 manufacturing occupation, and 4 business administration occupations. The business occupations all require a bachelor's degree, while of the other 7 roles, only two require a bachelor's degree. The occupation with the highest number of annual openings is construction laborer.

Perceptions from interviewees mostly align with the data projections for growth. In particular, people from all three counties shared that they are seeing significant growth in healthcare and the trades, especially electricians, plumbing, carpentry, and framing.

Reductions were harder for interviewees to name. Some said computer science careers, which aligns with the low numbers of projected annual openings in Klamath County, though that was also named as a growth industry due to the increasing number of high tech companies in Jackson County and increased number of remote workers in the region. Jackson and Josephine Counties show 198 projected annual openings in high tech over the next decade. One interviewee said, "I just don't see a lot of growth here."

EXISTING PATHWAYS

The existing pathways to these careers are grouped by the four high-growth industries: healthcare, construction, high tech, and manufacturing. There are also broader opportunities in STE(A)M offered to students in early learning scenarios as well as in elementary and middle school.

Overall, the data show that manufacturing pathways are well positioned to meet the economic growth projections for the region. This is likely due to the work this region has already put into meeting that need. Construction and healthcare growth are both quite high, and the data show gaps in the availability of pathways offered toward those careers. And finally, high tech growth is slower than the other three industries and is well met by existing pathways available.

The healthcare industry is projected for the highest growth in the region, especially in light of the strain covid-19 is placing on local healthcare workers and the recent addition of the Sky Lakes Medical Center, but the data show potential gaps toward some of these careers. Though postsecondary pathways are plentiful and of high quality, more healthcare CTE pathways during high school would be valuable.

The construction industry is also projected for high growth, especially in light of the recent fires, but the data show potential gaps toward some of these careers. In particular, more construction CTE pathways during high school would be valuable. Additionally, expanding carpentry postsecondary opportunities to local apprenticeships would support that high growth pathway. Finally, there is a simple bottleneck problem when it comes to the number of available construction apprenticeships compared to both the number of students interested in completing them and the number of vacant construction positions needed to be filled in the region.

The high tech industry has fewer projected annual openings and significantly less in Klamath and Lake Counties than Jackson and Josephine. All three counties are well positioned to meet the need for high tech graphic design careers. However, despite an apparent gap in pathways to high tech careers in Klamath County schools, it is not as urgent as pathway gaps in other areas.

Finally, while manufacturing is a high growth industry, the data show that the region hosts many well-regarded pathways for students to reach these careers at both high school and postsecondary levels.

PARTICIPATION IN PATHWAYS

With the intention of understanding who benefits from the existing pathways and opportunities described above, and who is left out, we have analyzed available data on CTE program completers, as well as student body data the two community colleges and two four-year universities within Jackson, Josephine, and Klamath Counties. However, the publicly available data is limited and incomplete.

The available data show diversity of race, ethnicity, gender, and occasionally origin and socioeconomic status. However, the data do not examine equity or inclusion, which would require further analysis into the experience of the participants throughout the pathways.

HIGH SCHOOL CTE PROGRAM PARTICIPATION

The available data clearly show that the target populations named by OCF are underrepresented in high school CTE program completers.

In all available CTE programs, students of color complete at a much lower rate than their white counterparts. However, they do complete at rates on par with their regional representation in transportation technology. They complete at significantly lower rates than their regional representation in manufacturing and engineering, agricultural science and technology, and health science and occupations. There are a few exceptions - Hispanic/Latinos complete at higher rates than their regional representation in information and communications technology.

Economically disadvantaged students represent just over 73% of the regional student body, as measured by their free or reduced lunch qualification, and complete these programs at much lower rates than their regional representation.

Females complete at lower than their regional representation in transportation technology, manufacturing and engineering, and agricultural science and technology. However, they complete at nearly equal rates as males in information and communication technology programs. And females are significantly overrepresented in the health sciences and occupations programs, with males at just over 20% of the completing group.

There is not enough data available to demonstrate participation rates in Construction Technology pathways from the 2018-2019 school year, as only one high school offered the program at the time and only four students completed.

POSTSECONDARY PARTICIPATION

There is limited data available on the participation of the target populations in postsecondary career pathways. Income and rural data are not available for students at Southern Oregon University, Oregon Institute of Technology or Klamath Community College, nor is gender or race data available for specific high-wage, high-demand career pathway degree programs, so no conclusions can be drawn from the data about representation in their career pathways.

However, Rogue Community College published their 2018-19 Disproportional Enrollment Report, providing data that shows "women are still under-represented in some traditionally male Career and Technical Education (CTE) programs and continue to make up the majority of traditionally female CTE programs." It is likely this pattern is also the case at the other three postsecondary institutions in the region. Income and rural data are not available for pathway participants at RCC, like the other postsecondary options.

BARRIERS

Barriers to these career pathways exist for students, educators, and employers alike.

STUDENTS

Students face barriers on their path to high-wage, high-demand careers from a variety of sources. Some are ubiquitous in this vast rural region and some are more pronounced for the target populations of the OCF grant: girls, low-income students, and students of color. The primary barriers revealed by the data are described here.

Students in Southern Oregon, especially those in rural and remote areas face transportation and internet access challenges, making career exposure complicated. A lack of awareness of options available to them and a perceived push for college at the expense of the trades also inhibit students from participating in and completing career pathways. Additionally, the data show that many people in the region do not actively acknowledge differences in access and opportunity among different populations, which could prevent students from receiving culturally responsive experiences.

The data show that girls face the additional barrier of subtle and sometimes more direct messaging that careers in manufacturing, or anything involving math, are not for them.

The data show that low-income students face further challenges due to the networking gap - their lack of connections to people within these high-growth industries, which is the easiest way in. They also lack the finances to pay for many of the up-front costs like course fees or equipment. Finally, in the face of compounding crises, low-income students often have to address their immediate or basic needs before they can consider their future, preventing them from exploring opportunities or feeling hope.

Students of color infrequently see educators or professionals in these careers who look like them, missing out on opportunities to inspire hope and belief without role models. Additionally, many Hispanic/Latino students face a language barrier for either themselves or their parents, causing further difficulty in reaching these careers.

EDUCATORS

Educators who want to support students toward these high-wage, high-demand careers struggle with their misalignment to the requirements dictated by educational standards. The data show that career-orientation is seen as extra rather than a mandatory component of education. Because of this, school schedules are oriented around the requirements of English and Math rather than future careers. And finally, interviewees renewal that the educator job description continues to grow, leaving little time or energy for supporting students toward high-wage, high-demand careers.

EMPLOYERS

Employers face challenges when it comes to liability, preventing them from hiring students under the age of 18 or even allowing them on the factory floor in some cases. They also struggle with hiring and retaining a skilled workforce, given the amount of on-the-join training needed when school curriculum does not align with necessary skills or when new hires are not adept in professionalism, despite a collaboratively developed employability skills rubric available in Appendix 4: Employability Skills Rubric.

QUALITIES OF A SUCCESSFUL PATHWAY

The qualitative data provide a strong picture of qualities of a successful pathway to high-wage, high-demand careers in these growth industries of Southern Oregon. The key qualities are listed below:

1. Pathways should be **pervasive** such that it incorporates applied learning and career exposure for **all students** starting from an **early age** and continuing without interruption until employment.

2. Pathways should be **systemic** in that they are integrated into the expected standards of schools and not considered extra work for educators or extracurricular for students.

3. Pathways should incorporate **strong relationships** between students and educators, educators and employers, and students and employers.

4. Pathways should address known **student barriers** for all students in the region, and especially girls, low-income students, and students of color.

5. Pathways should address known **employer barriers** such as liability, a drug-free workplace, and up-to-date curriculum.

POSSIBLE SOLUTIONS

The data have revealed six primary solutions that address most if not all of the qualities of successful pathways. They include the following:

1. **More extensive internships** and job shadowing would increase applied learning and early career exposure for students and have the potential to address most student and employer barriers. Youth Pathways Partnership in Josephine County is already doing this well. However, without integrating them into required school curriculum, internships alone are unlikely to increase access for the target populations.

2. **Virtual career exposure** would increase awareness of careers, especially for rural students, and build relationships between educators and industry. If integrated into the classroom for all students and if effort is made to ensure industry representatives mirror the student population, it could improve outcomes for target populations. Oregon Connections is a current way of doing this, and is distributed via Nepris through Southern Oregon ESD. However, virtual career exposure continues to be omitted from state educational standards, making these efforts above and beyond the expectations of classroom educators.

3. **Parent education programs** could lead to expanded career exposure by leveraging the parent-child relationship. If transportation or internet is paid for and coordinated, and any industry and education representatives mirror parent participants, this could build support and awareness around career opportunities for parents in the region, ultimately influencing students as well. Rogue Community College is currently developing an opportunity like this. However, this solution does not create direct opportunities for applied learning, cannot possibly be required, and does not address educator or employer barriers.

4. **Teacher and counselor externships and pathway mapping** leads to more well-informed educators regarding the wide range of potential career paths available to students, making them more equipped to advise and guide students toward opportunities that would fit their strengths. This would build connections between educators and industry, and leverages the educator-student relationship, causing their influence to develop career awareness for students, particularly if the careers demonstrated are in the trades. If the opportunity is free or paid for educators,

includes a meal and transportation, and takes place during the summer or during a scheduled in-service day, more educators would be able to participate. If opportunities like these are required or incorporated into expected educator roles, then they would be more likely to reach all of the target populations. So, while this possible solution does not directly address employer barriers or provide an applied learning opportunity, it does bring students awareness and exposure by proxy. Southern Oregon ESD's teacher externship program could be a model for this.

5. **A collective training facility**, paid for by local industry, where future employees could gain knowledge and skills in their chosen field would create the opportunity for students to participate in applied learning. It would address student barriers if transportation is paid for and coordinated, and if trainers mirror student participants. This would build experience, reduce stigma around the trades, and build relationships among industry employers to collaborate. It would also address employer barriers, because training would be conducted off-site, avoiding liability concerns, and employers would have a wide selection of well-prepared talent to hire from. However, this solution does not provide early exposure to careers, rather builds experience for students who have selected a career already. It also does not integrate into the education system or address educator barriers, rather adds another layer to the pathway that transforms students into employees. In other words, this would have to be a chosen path for students, so it may not reach the target populations identified.

6. **Stronger coordinated connections among high school, postsecondary, apprenticeships, training programs, and employers** would develop the culture and environment for improved high-wage, high-demand career pathways for students in Southern Oregon. Interviewees expressed the need for an external entity that would take on the role of connector, communicator, and convener. Though this solution does not directly address student barriers, employer barriers, or provide a direct applied learning experience, it focuses on building a systemic and integrated approach to high-wage, high-demand career pathways. Interviewees shared the desire for it to communicate opportunities, connect educators and employers, and convene key players in the region. To some extent, this already exists in the form of the Business Education Partnership, the Rogue Valley Advanced Manufacturing Partnership, or the Southern Oregon STEM Hub. However, for this to truly increase access for the target populations, that would need to be a named goal with explicit strategies for each group, and accountability measures, rather than an unintended outcome of strategies that address all students.

VISIONING

With more successful career pathways that engage girls, low-income students, rural students, and students of color, Southern Oregon community members envision their region full of people with purpose, who value education, who stay to contribute to the economic and social fabric of their community, and who develop an open-mindedness that expands beyond increased diversity.

INTRODUCTION

Southern Oregon's regional (Jackson, Josephine, and Klamath counties) Science, Technology, Engineering, and Math (STEM) Hub has been invited to build local capacity for STEM through a grant opportunity with Oregon Community Foundation (OCF). OCF's IGNITE grant seeks to ignite partnerships between business and education to advance opportunities for specific target populations in Career and Technical Education (CTE)-STEM: rural, low-income, students of color and girls. OCF will do this through technical assistance and providing capacity-building and challenge grants that are aimed at incentivizing local resources centered on deepening buy-in and investment for CTE and STEM education regionally. Southern Oregon's STEM Hub works together with CTE within our Southern Oregon Education Service District's (SOESD) School Improvement Team to provide age-appropriate awareness, exploration and deeper understandings and applications of skills learned from Pre-K through Post-Secondary opportunities that align to high wage, high demand jobs that are available in our region.

To prepare for that opportunity, the Southern Oregon STEM Hub retained Dialogues in Action (DIA) to conduct a needs assessment. DIA developed an interview protocol and purposeful stratification, received input from the Guidance Group on valuable community members to interview, and interviewed a total of 34 individuals. Additionally, DIA conducted background data analysis on existing data on the region's employment and education pathways and outcomes. Finally, the data findings were presented to a group of community leaders, who workshopped them, elevated the most salient points, and contributed to a series of possible responses to the needs assessment.

In the report below, DIA provides a clear picture of the region's employability and economic growth for high wage, high demand careers; available pathways and opportunities to increase access for target populations; and accessibility gaps and opportunities for industry and education to actively partner to strengthen pathways for target populations, leading to high wage, high demand jobs.

ABOUT DIALOGUES IN ACTION

Dialogues in Action LLC (DIA) is a small consulting firm based in Portland dedicated to rethinking the development of people through evaluation, strategy and leadership development. Since 2006, we have been providing expertise to social sector organizations throughout North America and beyond to help them deepen and expand their impact. We believe in the power of an intentional conversation. We also believe in the potential for people, communities, and society to grow, evolve, and reach their fullest potential.

A PICTURE OF THE REGION

The Southern Oregon STEM Hub serves Josephine, Jackson, and Klamath Counties, which includes 13 school districts and 8 percent of the state's school-aged population. Given the focus of the IGNITE grant, it is valuable to understand the demographics and geography of the region and its school districts. The population and demographics of the region are shown in **Table 1**.

Table 1: Regional Demographics

County	Total population[2]	% Population Change[3]	% White (Non-Hispanic)[4]	Median Household Income[5]	Poverty Rate[6]
Jackson	214,267	8.9%	81.2%	$50,851	16.3%
Josephine	85,481	4.9%	87.1%	$43,046	18.6%
Klamath	66,310	2.7%	78.4%	$43,522	20.3%
Full Region	**366,058**	**6.8%**	**82.1%**	**$47,701**	**17.6%**

The region is predominantly white (Non-Hispanic). The next largest ethnic groups are White (Hispanic), followed by Multiracial, Asian, and Native American. Klamath County in particular has a large Native American population, primarily based around Chiloquin. The region has increased in population over the past decade, mostly in Jackson County. Poverty rates are above the national average of 13.1 percent. According to the University of Wisconsin's Population Health Institute, out of Oregon's 35 counties, SOESD's three counties are ranked at number 16 (Jackson), 33 (Josephine), and 35 (Klamath). Childhood poverty and crime rates for all three counties are above the state average.

The region is also mostly rural or remote, with a few small urban/suburban hubs, as shown by **Table 2**. Klamath is the most rural of the three counties. The more suburban hubs include Grants Pass, Medford, Ashland, and Klamath Falls, and smaller towns include Phoenix, Talent, Eagle Point, and Chiloquin.

Table 2: Regional Geography

County	Land area in square miles[7]	Population per square mile
Jackson	2,783.55	76.98
Josephine	1,639.67	52.13
Klamath	5,941.05	11.16
Full Region	**366,058**	**35.31**

[2] Data USA. datausa.io. 2018
[3] April 2010-July 2019. "2019 Annual Population Report Tables." Population Estimates, Population Research Center, Portland State University.
[4] Data USA. datausa.io. 2018
[5] Data USA. datausa.io. 2018
[6] Data USA. datausa.io. 2018

[7] QuickFacts: Jackson County, Josephine County, Klamath County, Oregon. United States Census Bureau, 2010. https://www.census.gov/quickfacts/fact/table/jacksoncountyoregon,josephinecountyoregon,klamathcountyoregon/PST045219

Table 3: School District Demographics[8]

District	County	Type[9]	# of students	% white	% American Indian	% Hispanic/ Latino	% Multiracial	% FRL	% EEL	Students with Disabilities	Mobile	Languages Spoken
Ashland SD	Jackson	City or Suburb	2,843	74%	1%	12%	12%	31%	5%	14%	11%	20
Butte Falls SD	Jackson	Rural Remote	228	86%	1%	10%	3%	69%		26%	19%	1
Central Point SD	Jackson	City or Suburb	4,868	75%	1%	16%	7%	76%	7%	17%	13%	14
Eagle Point SD	Jackson	City or Suburb	4,154	64%	1%	30%	5%	78%	17%	14%	19%	26
Medford SD	Jackson	City or Suburb	14,468	65%	1%	26%	5%	65%	14%	16%	16%	37
Phoenix-Talent SD	Jackson	City or Suburb	2,578	52%	1%	38%	8%	85%	25%	14%	17%	15
Pinehurst SD	Jackson	Rural Distant	10	90%	0%	0%	10%				38%	1
Prospect SD	Jackson	Rural Remote	213	89%	0%	3%	8%	95%		14%	19%	1
Rogue River SD	Jackson	Rural Distant	1,099	82%	1%	9%	7%	67%		20%	25%	3
Grants Pass SD	Josephine	Town Fringe	6,218	76%	1%	15%	7%	95%	5%	14%	14%	27
Three Rivers/ Josephine County SD	Josephine	Rural Fringe	4,814	80%	1%	11%	7%	69%	5%	13%	20%	21
Klamath Falls City SD	Klamath	Town Remote	2,959	61%	6%	23%	8%	79%	8%	16%	24%	15
Klamath County SD	Klamath	Rural Remote	6,841	66%	5%	20%	7%	79%	11%	15%	17%	13

[8] Oregon Department of Education Adjusted School District Reports Cards. 2019-2020.

[9] ESRI, National Center for Education Statistics, ECONorthwest. Locality designations from USDA's Rural-Urban Commuting Area Codes

The region includes 13 school districts, serving 51,293 students in the 19-20 school year.[10] Details for each district are included in **Table 3** above.

The qualitative data show that for the most part, residents are proud of certain aspects of their region. In particular, interviewees share that the beauty of the region, the outdoor activities, and the small town connections are reasons to love where they live. One interviewee said, “A lot of people have strong family roots here. People want to stay here because their families are here. That’s important to most people in this area.”

However, others share that there are challenges in attracting people to move to the region or convincing young people to stay. One employer said, when referring to hiring from out of town, “It’s challenging to attract professionals, because you don’t have the other technical opportunities to get folks here. If the spouse requires some kind of technical field, they won’t come here.” Another said, “Where we are is rural, there are no large cities anywhere close. We are five hours from Portland, five hours from the Bay. We’re surrounded by the middle of nowhere. I don’t see a lot of opportunity here. The cost of living is relatively high despite being rural. It’s difficult to keep people here. They go away and stay away, like a typical rural area.”

The following sections expand on the strengths and opportunities of the region.

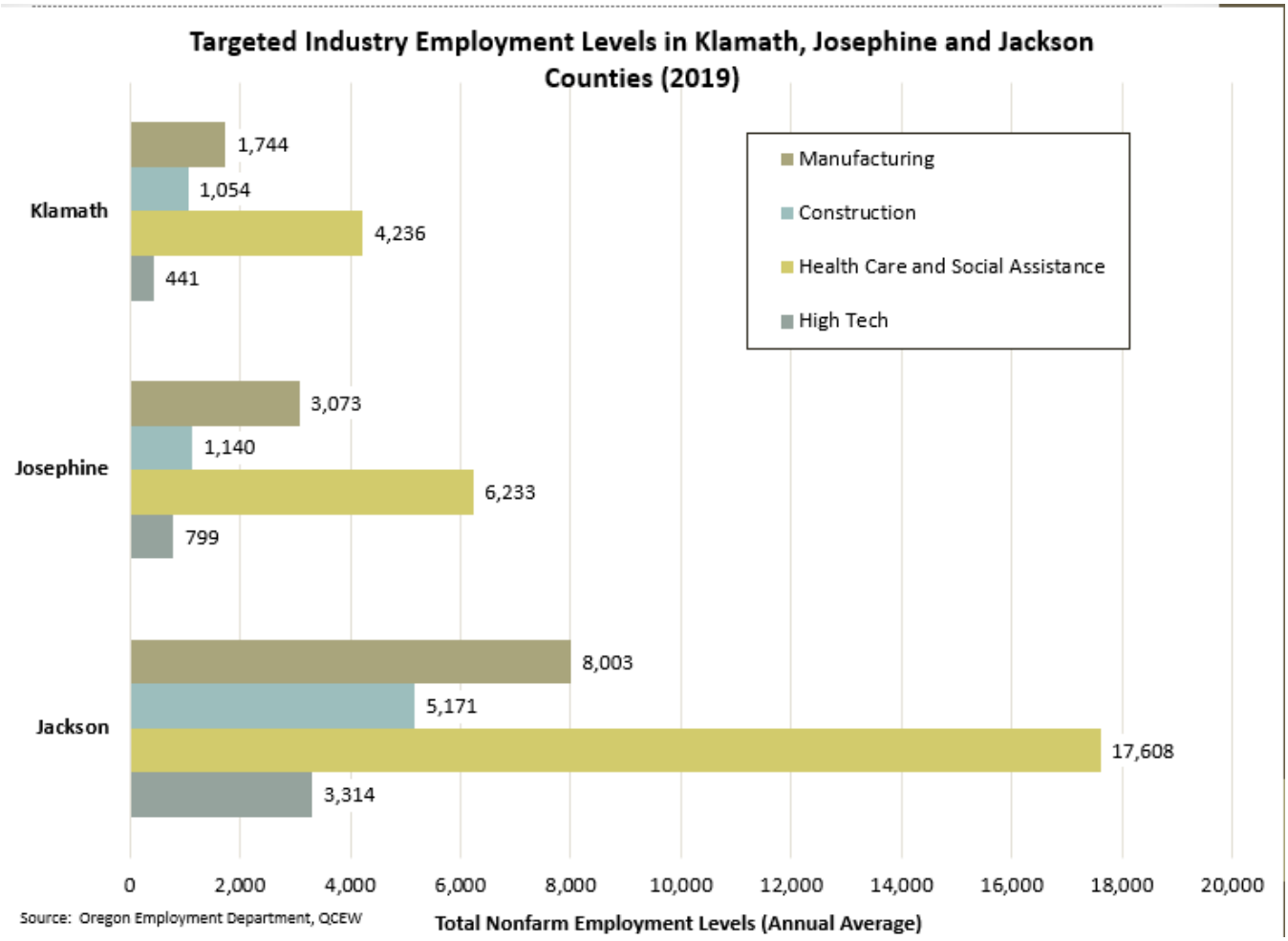
[10] Oregon Department of Education Adjusted School District Reports Cards. 2019-2020.

EMPLOYABILITY AND ECONOMIC GROWTH FOR HIGH-WAGE, HIGH-DEMAND CAREERS

The region is experiencing significant growth in some industries, while reduction or stagnation is happening in few others.

Figure 1 below shows the nonfarm employment levels in each of the four leading industries by region. Healthcare and Social Assistance rise to the top as being the most prevalent employment options in each county, followed by manufacturing. The highest employment levels are in Jackson County, which is also the most populous.

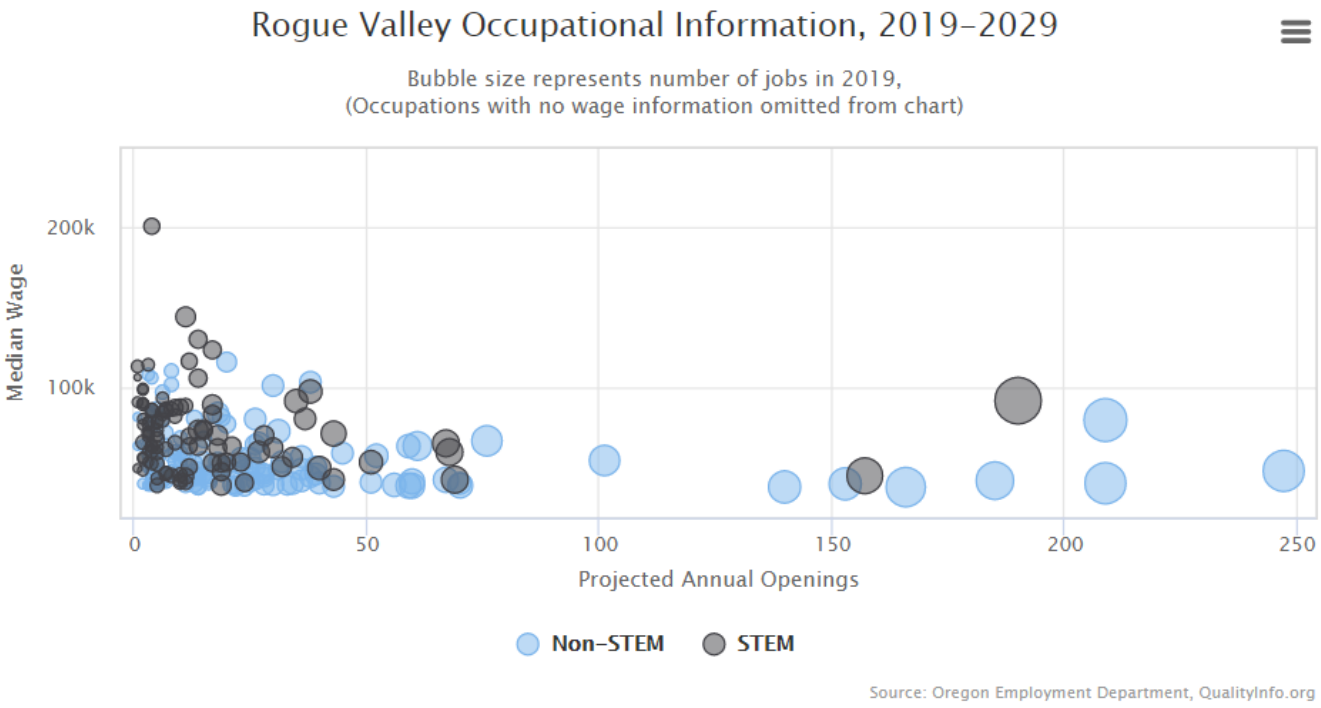
Figure 1: Targeted Industry Employment Levels in Klamath, Josephine, and Jackson Counties (2019)[11]



[11] Oregon Employment Department, QCEW

Below, **Figure 2** shows occupations found in Jackson and Josephine Counties, and their expected growth from 2019-2029. Of the 304 occupations considered high wage, one of the highest demand occupations is that of registered nurses, whose median annual salary pays nearly $100,000. 93 of those occupations require only a high school degree and include many construction and manufacturing roles. An additional 61 occupations require either an associate's degree or other post-secondary training. And the remaining 134 occupations require a bachelor's degree or above.

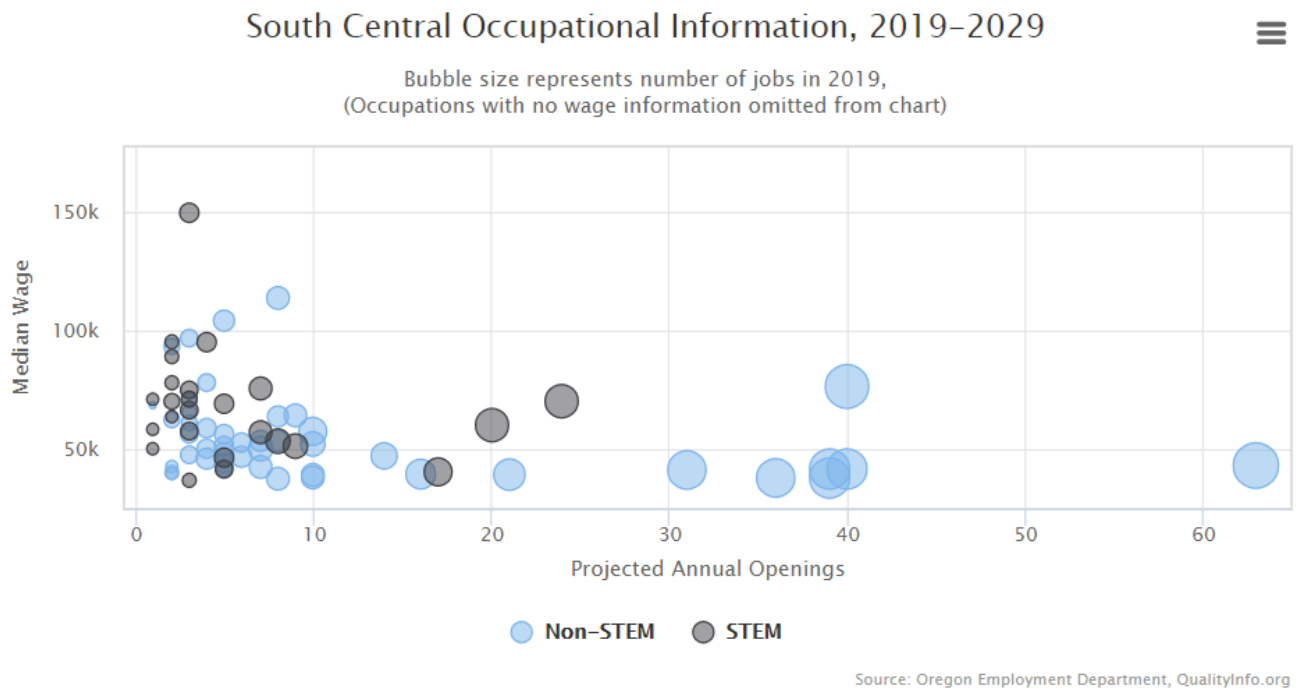
Figure 2: Rogue Valley Occupational Information, 2019-2029[12]



[12] Oregon Employment Department, QualityInfo.org

Figure 3 shows the high wage roles in Klamath and Lake County combined. The Oregon Employment Department's website does not disaggregate the two counties for specific detail into Klamath County only. Of the 119 occupations considered high wage, the highest demand occupation is construction laborers, whose median annual salary pays just barely above the median wage for the region. 49 of those occupations require only a high school degree and include many construction and manufacturing roles. An additional 21 occupations require either an associate's degree or other post-secondary training. And the remaining 45 occupations require a bachelor's degree or above.

Figure 3: South Central Occupational Information, 2019-2029[13]



However, when we home in on high-wage, high-demand occupations within the four growth industries of Construction and Trades, Healthcare, High Tech, and Manufacturing and Engineering, the data tell a different story.

73 of the 149 occupations in Jackson and Josephine Counties, and 27 of 66 occupations in Klamath and Lake Counties, with a median annual income of $40,000 or more are in the four high growth industries: Construction and Trades, Healthcare, High Tech, and Manufacturing and Engineering. The remaining occupations are mostly within the business administration, retail, and hospitality industries.

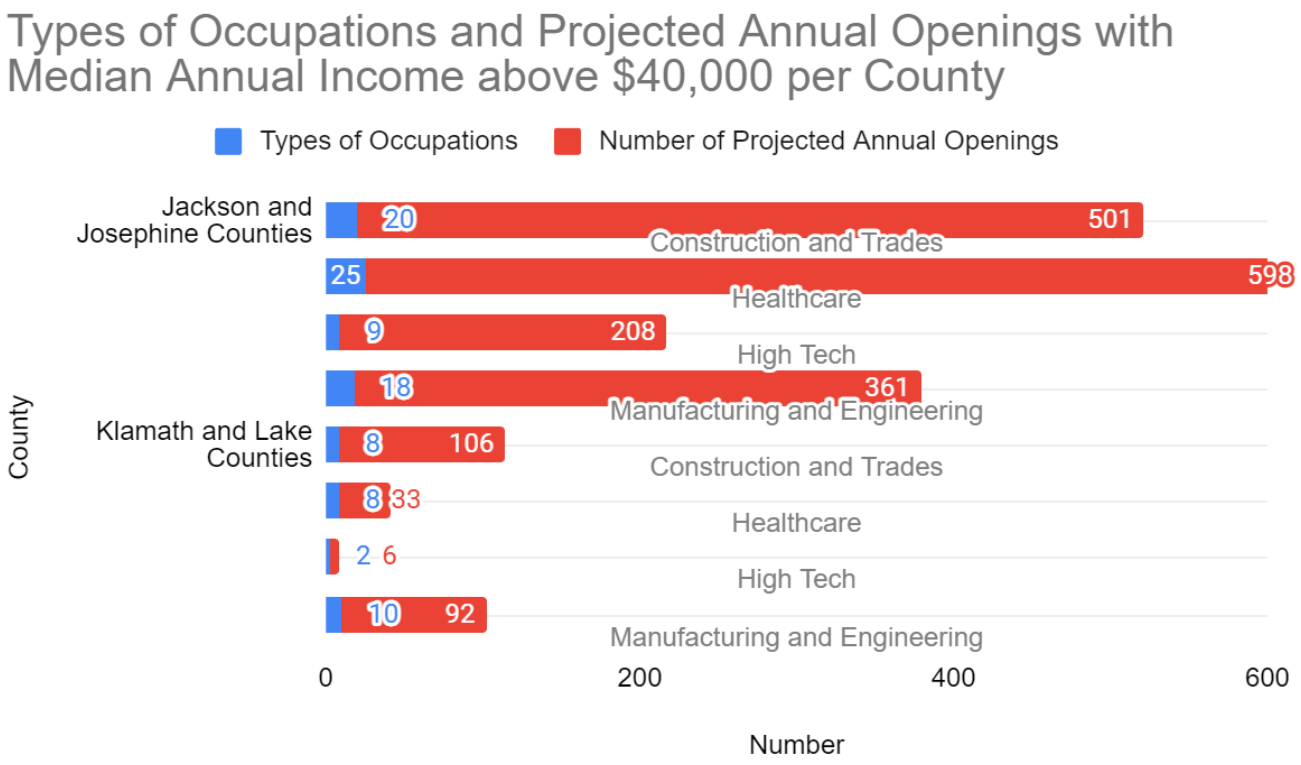
In Jackson and Josephine Counties, the industries with 10% growth or more projected through 2029 include 16 healthcare occupations, 15 construction occupations, 10 manufacturing occupations, and 5 high tech occupations. The remaining occupations fit within business operations and human services. Most of the highest growth occupations require a bachelor's or associate's degree, with the exception of the roles of Farm Equipment Mechanic, Industrial Machinery Mechanic, and Plumbers, among others. The occupation with the highest number of annual openings is truck drivers, followed closely by registered nurses.

[13] Oregon Employment Department, QualityInfo.org

In Klamath and Lake Counties, the industries with 10% growth or more projected through 2029 include 3 healthcare occupations, 3 construction occupations, 1 manufacturing occupation, and 4 business administration occupations. The business occupations all require a bachelor's degree, while of the other 7 roles, only two require a Bachelor's degree. The occupation with the highest number of annual openings is construction laborer.

The Oregon Employment Department data in **Figure 4** show that Klamath and Lake Counties are projected to have far fewer high demand roles that pay more than the median income of the region. When analyzing projected annual positions among occupations that pay above a median annual income of $40,000, Jackson and Josephine Counties offer both more positions and more variety.

Figure 4: Types of Occupations and Projected Annual Openings with Median Annual Income above $40,000 per County[14]



Klamath County does show more business and administrative positions that are high wage, high demand, but do not fit into the four high growth industries.

Perceptions from interviewees mostly align with the data projections for growth above. In particular, people from all three counties shared that they are seeing significant growth in the trades, especially electricians, plumbing, carpentry, and framing.

For example, an electrician in the Rogue Valley in 2020 has an annual average salary of $62,791, which is significantly higher than the median household income just between $40,000 and $50,000. Projections show that there will be an 11.9%

[14] Oregon Employment Department, QualityInfo.org

increase in need for electricians over the next decade, with nearly 60 annual openings. Interestingly, the employment growth of electricians in Klamath and Lake Counties is negative at -1.5% over the next decade, though there are still 8 projected annual openings per year. A typical entry level education for an electrician is a high school diploma, and those with postsecondary training have a competitive advantage in the market. Plumbing shows similar projections and wages.

Interviewees from all three counties also see growth in health occupations, despite temporary hiring freezes and reductions due to covid-19. This is where the available data contradicts interviewee perceptions. While there is certainly upcoming growth in high-wage, high-demand healthcare careers in Jackson and Josephine Counties, the same is not apparent in Klamath County.

One interviewee from Klamath County said, "We're definitely seeing growth in healthcare. We just built a new building with OHSU to house Sky Lakes medical offices and bring in a new physical therapy program. OIT is growing, too. It has one of the top medical imaging programs in the country." A press release from the opening of the Sky Lakes Medical Center, shows that the company employs more than 1,500 people.[15] This facility must not be not reflected in the Oregon Employment Department Data, or it would show more than 6 high-wage, high-demand annual openings for healthcare in Klamath County. For the purposes of this report, we will consider healthcare positions to be high-wage and high-demand in all three counties, as a result.

Registered nurse is one of the highest demand occupations in the region and show an average annual salary of $91,639. Projections show that there will be a 14.1% increase in need for registered nurses of the next decade with nearly 200 annual openings. A typical entry level education for this occupation is a bachelor's degree, though postsecondary training and associate's degrees can get students in the door at lower levels of the role, through Certified Nursing Assistant (CNA), Licensed Practical Nurse (LPN), and associate's degree in Nursing (ADN) pathways.

Reductions were harder for interviewees to name. Some said computer science careers, which aligns with the low numbers of projected annual openings in Klamath County, though that was also named as a growth industry due to the increasing number of high tech companies in Jackson County and increased number of remote workers in the region. Jackson and Josephine Counties show 198 projected annual openings in high tech over the next decade. Another said, "I just don't see a lot of growth here," though could not name any reductions either.

The data show that interviewees are worried about the future of their region's economic growth for two main reasons: progress stalling due to ongoing crises, and the "brain drain" occurring in the region.

One interviewee from Klamath County said, "Covid-19 and the fires have hit our community hard with firing freezes and small businesses closing down. Economically, in a small town, that hurts even more. How do we revitalize hiring practices for larger organizations and come back from economic downturn and tragedy?" Another interviewee brought up the mental health implications of the region's compounding crises. "People are struggling right now. People are overwhelmed for a variety of reasons: everyone's more stressed, anxious, frustrated."

People from all three counties mentioned the concern of losing valuable people from the region. From Josephine and Klamath Counties, interviewees worried about youth leaving the area after they graduate from high school and not coming back. Six student interviewees confirmed that they plan to leave their region when they are of age, though could not

[15] "Klamath Falls celebrates new Sky Lakes Collaborative Health Center's opening." OHSU News. December 12, 2019. https://news.ohsu.edu/2019/12/12/klamath-falls-celebrates-new-sky-lakes-collaborate-health-centers-opening

explicitly name where they would go. That said, they each asserted that they enjoy living where they do and would not change much about their hometown.

Another interviewee shared, “We’re having such a huge change in leadership in different parts of the community. It’s been going on for a while and it’ll continue. There’s a discontinuity because relationships are broken and initiatives need to start over in some ways while there’s learning for the new person.” These gaps in human capital can both slow economic growth and create a sense of loss and loneliness among those who stay in the region.

Yet there was a pervasive sense of hope among interviewees due to the community’s supportive nature and consistent desire for improvement. One interviewee said

> I’m hopeful about the collaboration and the communication and the collective resiliency of this community, and knowing what the end game is, and working on how to get there in stages. There’s no question, when you talk about why these discussions are important, we don’t have to convince people why. That’s what I’m hopeful about.

Another interviewee focused on the dedication to youth, “It’s a diamond - the community is so open to supporting kids, and making this pipeline grow. They’re willing to go above and beyond in every sector.” A third interviewee discussed the hopefulness about the revitalization of Klamath Falls, “Klamath Falls as a whole, there’s a lot of energy and positivity through change - downtown revitalization plan, new development on the waterfront, new features of our community that are bringing people to our community. There’s a lot that goes into livability and quality of life. There are new biking trails, restaurants, attractive features of the community. That could attract more people.”

EXISTING PATHWAYS AND OPPORTUNITIES

Southern Oregon currently has a variety of pathways and opportunities for students to gain exposure and experience toward high-wage, high-demand careers. Taken individually, they range from specialized middle school classes to out-of-school programming, from individual high school classes, to formal CTE high school pathways, from community college certificates and degrees to four-year university programs, from on-the-job training to elaborate partnership initiatives. Viewed as true pathways for individual students, they show the potential saturations and scarcities in future employees for the region’s high growth sectors.

The following section highlights pathways and gaps toward the high-wage, high-demand careers that in Southern Oregon, separated into the four primary growth industries: manufacturing, construction (especially the trades), high tech, and healthcare. We have added a broader STE(A)M pathways section as well as an analysis of what makes a successful pathway. We have also highlighted differences among the counties.

Overall, the data show that manufacturing pathways are well positioned to meet the economic growth projections for the region. This is likely due to the work this region has already put into meeting that need. Construction and healthcare growth are both quite high, and the data show gaps in the availability of pathways offered toward those careers. And finally, high tech growth is slower than the other three industries and is well met by existing pathways available.

HEALTHCARE

The Oregon Employment Department predicts a nearly 13% growth rate in employment in the healthcare industry for Jackson, Josephine, Klamath, and Lake Counties over the next decade. Most of these positions require a bachelor’s degree or higher, though some high-demand occupations are achievable with an associate’s degree or other postsecondary certificates. With 631 projected annual openings, this is the largest growth industry for the region.

Only three high schools in these counties have health occupations or health sciences CTE pathways: Grants Pass, Henley, and South Medford.. **This is a potential gap in pathways to these high growth careers.** One health occupations teacher at Henley High School went to the same school where she now teaches, attended Oregon Institute of Technology (OIT) in Klamath Falls, and continues to work as an X-Ray Technician in Mammography. She also does outreach to students in more rural schools, though cannot offer a full CTE pathway at those. She shared how she connects students to high-wage, high-demand career paths through her program:

> My students begin with me their freshman year with an intro course. I also reach out to more rural high schools and teach via camera. These are minority driven schools. In this intro class, we do basic career exploration, types of degrees, wages possible. After that, we do more advanced courses, health occupations 1, articulated with our local community college. That's where we reach out into the community and my students shadow all year long. Some want to go to a birthing center, but I make them go to many places. This allows them to ask questions, see what the settings are like. I reach out to dental offices, orthodontists, vet clinics. Then in senior year, they can take a Certified Nursing Assistant course at Klamath Community College for free, which is currently a high demand but not a high wage job, but it's a stepping stone to get into a higher wage program.

Students in Klamath County also have the opportunity to participate in HOSA - Future Health Professionals, a Career Technical Student Organization (CTSO) that is recognized nation-wide for its mission to empower students to become leaders in the global health community through education, collaboration, and experience.

Upon completion of these CTE pathways at the high school level, students have the opportunity to continue on to one of several associate's degree or certificate programs, depending on their career goals. For those unsure of which healthcare career they are interested in, both Klamath Community College (KCC) in Klamath Falls and Rogue Community College (RCC) in Grants Pass offer a generic option: KCC offers an applied associate's degree in Health Services and RCC offers a certificate in Basic Healthcare.

For the future nurses, there are a variety of pathways involving differing levels of education and ultimate pay, shown in **Table 4**. Certified Nursing Assistants is the first step, requiring only a few community college courses and a certification test. Students also have the opportunity to attend Pacific Healthcare Training CNA 1 and 2 Certification classes in Jackson County.

That said, students must progress further in order to reach the high-wage, high-demand careers of Licensed Practical and Licensed Vocational Nurses (a certificate from RCC and a license from the state), Registered Nurses (an associate's degree of applied science from RCC or KCC and a license from the state), and Nurse Practitioners (a bachelor's degree in Nursing from Southern Oregon University - SOU - and a license from the state). Each of these careers are high-wage, high-demand in the region.

Table 4: Nursing Occupations in Southern Oregon

Occupation	2019- 2029 Employment Growth	2020 Median Annual Salary	Projected Annual Openings	Typical Education	Relevant County
Licensed Practical and Licensed Vocational Nurses	6.90%	$55,566	25	Postsecondary training (non-degree)	Jackson, Josephine
Nurse Practitioners	26.30%	$129,667	14	Master's degree	Jackson, Josephine
Registered Nurses	14.10%	$91,377	190	Bachelor's degree	Jackson, Josephine
Licensed Practical and Licensed Vocational Nurses	12.80%	$50,967	5	Postsecondary training (non-degree)	Klamath, Lake

For those with more administrative interests, RCC offers a certificate in Medical Administrative Assistant, leading to potential careers as Medical Records and Health Information Technicians or Medical Transcriptionists, both paying over the region's median annual wage and with a growth trajectory. Students would also be able to continue to a bachelor's degree and a higher annual salary through programs like SOU's bachelor's degree in Healthcare Administration or Oregon Institute of Technology in Grants Pass (OIT)'s bachelor's degrees in Health Care Management or Health Informatics. The career of Medical and Health Services Managers involves a salary over $100,000 and nearly 50 projected annual openings for the region.

For those interested in the dental field, RCC offers a Certificate in Dental Assistant, an occupation with 67 projected annual openings, a 13.7% expected growth rate, and a median annual salary of $42,038 in Jackson and Josephine Counties. Jackson and Josephine Counties are projected to have 35 annual openings for Dental Hygienists with a 13.4% growth rate, and Klamath and Lake Counties are projected to have another 3 annual openings. For these roles, students can obtain degrees from SOU's Pre-Professional Program in Dental Hygiene or OIT's bachelor's degree in the same. Students can even continue on with an SOU degree in Dentistry, to a postgraduate Dentistry School outside of the region.

Additionally, imaging and specialized healthcare roles are also on a growth path, and the region's postsecondary institutions are serving future employees well:

1. To become a Cardiovascular Technologist and Technician, with a 11.2% growth rate and over $80,000 median annual salary in Jackson and Josephine Counties, SOU offers a pre-professional program in medical technology in collaboration with Oregon Health and Sciences University (OHSU), and OIT offers two relevant bachelor's degrees: echocardiography, and vascular technology.

2. Similarly, to become a Diagnostic Medical Sonographer, SOU offers a Pre-Professional Program in Medical Technology in collaboration with Oregon Health and Sciences University (OHSU), and OIT offers a bachelor's degree in diagnostic medical sonography. One interviewee touted the combination of experience and professionalism gained through their OIT medical sonography degree: "My college was very strict on professionalism. We got professional evaluations, on rotations and on our externship.

Teaching those soft skills early on actually does create a better employee in the long run. Getting that experience of rotations and a one-year externship while in college prepared me for the job while I was in college. It was experience without the liability of being an employee. Because of that experience, I'm trying to incorporate those things into the high school level to better prepare students for when they get to the college level."

3. For Healthcare Social Workers, with a 12.6% growth rate and 15 projected annual openings, SOU offers a pre-professional program in psychology, counseling, social work, or human services.

4. For Occupational Therapists, with a 13.4% growth rate in Jackson and Josephine Counties and 6 projected annual openings, SOU offers a pre-professional program in occupational therapy.

5. For Pharmacists, whose median annual salary approaches $150,000, and have a 4% growth rate and 11 projected annual openings in Jackson and Josephine Counties, and 3 projected annual openings in Klamath and Lake Counties, SOU offers a pre-professional program in pharmacy, which would then need to be followed by Pharmacy School elsewhere.

6. For Physician Assistant, whose salary tops $100,000 and whose growth rate is over 35% in Jackson and Josephine Counties with 17 projected annual openings, SOU offers a pre-professional program in physician assistants, which would then need to be followed by Medical School elsewhere.

7. For radiologic technicians, with a salary above $70,000 and a growth rate above 11% in Jackson and Josephine Counties, SOU offers a pre-professional program in medical technology with OHSU and OIT offers a bachelor's degree in radiologic science.

8. For future respiratory therapists, making over $70,000, and with growth projected in Jackson and Josephine Counties, OIT offers a bachelors degree in respiratory care.

Additionally, healthcare organizations like Valley Immediate Care conduct a variety of career exposure opportunities through the Rogue Workforce Partnership, such as job shadowing and career days for middle school and high school students, externships for RCC students, internships for SOU healthcare administration students, and industry tours for teachers.

In summary, the healthcare industry is projected for the highest growth in the region, especially in light of strain covid-19 is placing on local healthcare workers and the recent addition of the Sky Lakes Medical Center, but the data show potential gaps toward some of these careers. In particular, more healthcare occupations CTE pathways during high school would be helpful.

CONSTRUCTION

The Oregon Employment Department predicts an 11% growth rate in employment in the construction industry for Jackson, Josephine, Klamath, and Lake Counties over the next decade. Most of these positions require no more than a high school diploma, and many can then advance through apprenticeships and union employment. With 607 annual openings, this is a high growth industry in Southern Oregon.

Only four high schools in these counties offer construction CTE pathways: North Medford High School, South Medford High School, Phoenix High School, and Eagle Ridge Charter High School, and none are based in Josephine County. **This is a potential gap in pathways to these high growth careers.** While these salaries are generally lower than those of healthcare, the occupations typically require less schooling and the industry continues to grow.

Upon completing high school, students have the opportunity to join an apprenticeship program. They can either do that through RCC or KCC, receiving credits as they go, or through a local union. The positions with the highest projected annual openings include carpenters with 13.5% growth in Jackson and Josephine Counties with 157 projected annual openings, construction laborers in Klamath and Lake Counties with 18.4% growth and 63 projected annual openings, and electricians with nearly 12% growth and 59 projected annual openings in Jackson and Josephine Counties. A fourth commonly cited growth occupation is that of plumbers, which shows a 16% growth in Jackson and Josephine Counties with 30 projected annual openings.

To become a construction laborer, no education is required; however, basic math skills are necessary. As one interviewee from Klamath County said, "Even if a school doesn't have a solid construction program, you could go into a random class and ask 'hey, do you know how to read a tape measure?' and start encouraging the relevance of math - convert from inches to feet, read where ⅞ is on a tape measure." At a median annual salary of $42,735 in Klamath and Lake Counties, this occupation barely qualifies as high-wage, though it is certainly considered high-demand. That said, if students are willing to go through an apprenticeship program through Oregon Laborers JATC or Oregon Columbia Laborers JATC, their wages can increase to nearly $30 per hour.

To become a carpenter, credentials and often an apprenticeship are required. Students in the region can get started with KCC's newly opened Carpentry 1 and Carpentry 2 courses, which result in a nationally recognized credential with the National Center for Construction Education and Research. There are three apprenticeship opportunities in the state, and though they all serve the entire state, they are all based in Portland. **This is a potential gap in pathways to the carpentry career**.

To become an electrician, RCC offers the option of apprenticeship for the following trades: inside electrician, limited manufacturing plant electrician, and sign assembler/maker. KCC also offers the following apprenticeships: inside electrician, limited manufacturing plant electrician. In addition, the Crater Lake Electrical JATC in Central Point offers apprenticeships in inside electrician, limited energy technician Class A, and renewable energy technician as well.

Upon completion of several years of apprenticeship, future electricians must receive their license to become a journeyman electrician. There are several types of licenses:

- General Supervising Electrician
- Limited Supervising Electrician
- General Journeyman Electrician
- Limited Journeyman Mfg Plant Electrician
- Limited Residential Electrician
- Limited Energy Technician Class B
- Limited Energy Technician Class A
- Limited Maintenance Electrician
- Limited Renewable Energy Technician
- Limited Journeyman Sign Electrician

Then, continuing education is required on an ongoing basis. KCC, RCC, and Crater Lake Electrical offer those courses regularly.

To become a plumber, KCC offers both plumber and industrial pipefitter apprenticeships, and RCC offers a plumber apprenticeship as well.

Additional apprenticeships exist in the following construction careers:

1. Sheet Metal Worker, S Central OR Sheet Metal JATC
2. Environmental Control System Servicer/Installer, Rogue Valley HVAC/R JATC
3. Assembler, Pre-Engineered Metal Building, Southern Oregon PEMB JATC

The qualitative data shows that while the pathway to being an electrician is technically available in the region, there are significant numbers of vacancies that have more to do with the process than building interest among young people. There are simply not enough journeymen who have the willingness, time, and skillset to mentor apprentices in order to advance their training. **This is a potential gap in pathways to a career as an electrician or plumber**. One industry professional in Klamath County said, "Electricians and plumbers training and apprenticeship lasts 4 years. In that apprenticeship, you have to work with someone who's already a licensed electrician or plumber. And that licensed person has to commit the 4 years, but they can only take on so many people per year. You need to train more people." Another industry professional said, "There aren't enough teachers to journey out some of those kids, and the waiting list is up to about 150 kids."

In summary, the construction industry is projected for high growth, especially in light of the recent fires, but the data show potential gaps toward some of these careers. One interviewee said, "There's room for construction technology, which isn't as robust as it could be. There are gaps around other trades like plumbing and electrical trades." In particular, more construction CTE pathways during high school, and especially adding at least one in Josephine County would be valuable. Additionally, expanding carpentry postsecondary opportunities to local apprenticeships would support that high growth pathway. Finally, there is a simple bottleneck problem when it comes to the number of available construction apprenticeships compared to both the number of students interested in completing them and the number of vacant construction positions needed to be filled in the region.

HIGH TECH

The Oregon Employment Department predicts a 9% growth rate in employment in the high tech industry for Jackson, Josephine, Klamath, and Lake Counties over the next decade. These occupations mostly require a bachelor's degree, though a few can be done with an associate's degree or other postsecondary certificates. With 204 projected annual openings, this is a key industry for the region's future.

Five high schools in these counties have CTE programs in Information and Communications Technology: Crater School of Business Innovation and Science, Eagle Point High School, Phoenix High School, Grants Pass High School, and North Medford High School, though none are based in Klamath County. **This is a potential gap in pathways to high tech careers, though Klamath County also offers fewer employment opportunities in tech.**

With only a postsecondary credential, students in this region can become a computer user support specialist, which shows a 11.4% growth trajectory in Jackson and Josephine Counties with 40 projected annual openings and a median annual salary of $49,375. Though the wages would be higher in Klamath and Lake Counties at $57,234, there are only 3 projected annual openings for the role. Both RCC and KCC offer a Career Pathway Certificate in Computer Support Technician for students to pursue this career.

With a bachelor's degree, students have the opportunity to pursue careers like Computer Network Support Specialists, Computer Systems Analysts, Network and Computer Systems Administrators, and Software Developers. RCC offers associate's of science transfer degrees in the following fields:

1. Computer Science Transfer to Southern Oregon University
2. Cybersecurity Transfer to Oregon Tech
3. Information Technology Transfer to Oregon Tech
4. Software Engineering Transfer to Oregon Tech
5. Computer and Embedded Systems Engineering Technology Transfer to Oregon Tech

Students at KCC can also receive an associate's degrees of applied science in both Computer Engineering Technology and Cybersecurity and Networking.

From there, students can continue on to SOU for bachelor's degrees in Computer Science or Mathematics - Computer Science. Students can also continue on to OIT for degrees in the following:

1. Cybersecurity
2. Technology and Management
3. Computer Engineering Technology
4. Embedded Systems Engineering Technology
5. Software Engineering Technology

In addition to the career paths above, there are also opportunities to become a graphic designer, which has a 6.8% growth trajectory, with 38 projected annual openings and a median annual salary of $44,002 in Jackson and Josephine Counties. Interested students can begin with a CTE pathway at one of seven high schools: Ashland High School, Phoenix High School, Grants Pass High School, Klamath Union High School, or South Medford High School in Graphic Design; or Crater Renaissance or Eagle Ridge High School in Digital Media.

After high school, students could then continue into a variety of community college programs, which would be all that is needed to begin a career in this field:

1. RCC: Career Pathway Certificate: Design and Digital Media: Adobe® Applications Technician
2. RCC: Career Pathway Certificate: Design and Digital Media: Social Media Technician
3. RCC: Career Pathway Certificate: Design and Digital Media: UI-UX Technician
4. RCC: Career Pathway Certificate: Design and Digital Media: Video Production Technician
5. RCC: Certificate: Design and Digital Media
6. RCC: Associates of Applied Science Degree: Design and Digital Media
7. RCC: Associates of Science Transfer Degree: Emerging Media and Digital Arts
8. KCC: Pathway Certificate: Multimedia Design
9. KCC: Associates of Applied Science Degree: Digital Media and Design

If students want to continue on for a higher salary and more opportunity, they could finish with bachelor's degrees from SOU in Emerging Media and Digital Arts or Communications.

Finally, students interested in web development can move from one of the high school CTE programs into KCC's pathway certificate program in web design. Though it is not a projected high-wage, high-demand career in Klamath County, there is a 11% growth rate and 14 projected annual openings in Jackson and Josephine Counties.

In summary, the high tech industry has fewer projected annual openings and significantly less in Klamath and Lake Counties than Jackson and Josephine. So, despite an apparent gap in pathways to high tech careers in Klamath County schools, it is not as urgent as pathway gaps in other areas.

MANUFACTURING

The Oregon Employment Department predicts an 8% growth rate in employment in the manufacturing industry for Jackson, Josephine, Klamath, and Lake Counties over the next decade. These occupations primarily can be done with only a high school diploma, but advancement is more likely with specified postsecondary certificates or apprenticeships. There are 453 projected annual openings over the next decade.

MANUFACTURING OR ENGINEERING TECHNOLOGY

Ten of the region's high schools offer CTE pathways in Manufacturing or Engineering Technology: Ashland High School, Eagle Point High School, North Medford High School, South Medford High School, Grants Pass High School (3 unique programs), New Bridge High School, North Valley High School, Chiloquin High School, Gilchrist Jr./Sr. High School, and Mazama High School. These high schools are spread across every county, though do not include every high school in the region. In addition to these CTE programs, many students have access to support from the SkillsUSA CTSO:

1. Ashland High School
2. Crater School of Business Innovation and Science
3. Eagle Point High School
4. North Medford High School
5. Rogue River High School
6. South Medford High School
7. Grants Pass High School
8. Mazama High School

From these CTE programs, students have several options to make their way toward high-wage, high-demand manufacturing jobs. They can become operators, technicians, or engineers for the variety of machines and devices used in manufacturing. Operators and technicians can get by with the high school diploma, or advance their prospects with a certificate or associate's degree from RCC or KCC. There are several available options:

1. RCC: Career Pathways Certificate: High Technology Studies: Plant Systems Technician
2. RCC: Career Pathways Certificate: Industrial Mechanics and Maintenance Technology: Mechanical Maintenance Apprenticeship
3. RCC: Career Pathways Certificate: Industrial Welding Technology - GTAW, SMAW, WIRE, and Welder's Helper
4. RCC: Career Pathways Certificate: Mechatronics - Fluid Power Specialist, Power Transmission, Maintenance Technician, Production Technician
5. RCC Certificate: Industrial Mechanical Maintenance Technology Apprenticeship
6. RCC Certificate: Industrial Welding Technology
7. RCC Certificate: Manufacturing/Engineering Technology: Computer Numerical Control Technician
8. RCC Certificate: Mechatronics Specialist
9. RCC Certificate: Mechatronics PLC Programming
10. RCC Certificate: Microcontroller Systems Technician
11. RCC Certificate: Sterile Processing Technician
12. RCC Associates of Applied Science Degree: Industrial Mechanics and Maintenance Technology Apprenticeship
13. RCC Associates of Applied Science Degree: Manufacturing/Engineering Technology
14. RCC Associates of Applied Science Degree: Mechatronics
15. KCC: Pathway Certificate: Welding (Gas Metal Arc/Wire Feed, Shield Metal Arc/Stick, Tig/Aluminum Stainless Steel Flat)
16. KCC: Associates in Applied Science: Manufacturing Engineering Technology

Additionally, companies like Quantum Innovations conduct significant on-the-job training, allowing employees to move up within the industry while earning a living wage. "We bring people in at a low wage, bring them through training, and change their compensation."

Additional apprenticeships exist in the following manufacturing careers:

1. Industrial Maintenance Millwright, Jackson County Millwrights JATC (through RCC)
2. Industrial Maintenance Millwright, Klamath Basin Industrial TATC (through KCC)
3. Manufacturing Plant Electrician, Rogue Industrial Electrical JATC (through RCC)
4. Manufacturing Plant Electrician, KIamath Basin Industrial TATC (through KCC)
5. Air Frame/Power-Plant Mechanics, Southern Oregon Aviation JATC
6. Boiler Operator, Southern Oregon Boiler Operators JATC

Engineers tend to require a bachelor's degree, many of which are available locally. RCC offers several associate's of science transfer degrees to OIT for engineering, including electrical engineering, manufacturing/engineering technology, mechanical engineering, and renewable energy engineering, and civil engineering. Once at OIT, students can finish with a bachelor's degree in any of the following engineering disciplines:

1. Civil Engineering (also MS)
2. Electrical Engineering
3. Electronics Engineering Technology
4. Geomatics
5. Renewable Energy Engineering (also MS)
6. Manufacturing Engineering Technology
7. Mechanical Engineering
8. Mechanical Engineering Technology

TRANSPORTATION TECHNOLOGY

Seven of the region's high schools offer CTE pathways in transportation technology: Ashland High School, Eagle Point High School, North Medford High School, South Medford High School, Phoenix High School, Illinois Valley High School, and Mazama High School. These high schools are spread across every county, though do not include every high school in the region.

Programs are intentionally "Transportation Technology because they include standards that align with both automotive and diesel technician standards. Upon completion of a CTE pathway in transportation technology, students have the option to continue on to RCC for a certificate in automotive specialist or an associate's of applied science degree in automotive technology; or to KCC for a pathway certificate in automotive technician or diesel technician, or an associates of applied science in automotive technology.

Truck Drivers, Heavy and Tractor-Trailer, have the highest number of projected annual openings in Jackson and Josephine Counties at 247, with a median annual salary of $47,584. This career can be obtained with non-degree post-secondary training and would be supported by many of the CTE pathways and post-secondary certificates mentioned above. In Jackson and Josephine Counties, automotive body repairers have a projected 11% growth rate, at 10 projected annual openings per year and a median annual salary of $58,882. With more openings but a lower median annual salary, automotive service technicians and mechanics show 69 projected annual openings per year and a median salary of $42,125. In Klamath and Lake Counties, bus and truck mechanics and diesel engine specialist occupations are increasing by 1.9% over the next decade, with 5 projected annual openings and a median annual salary of $46,067.

AGRICULTURAL SCIENCE AND TECHNOLOGY

Nine of the region's high schools offer CTE pathways in agricultural science and technology: Bonanza Jr./Sr. High School, Henley High School, Lost River High School, Hidden Valley High School, Crater School of Business Innovation and Science, Eagle Point High School, Phoenix High School, Prospect High School, and Rogue River Jr./Sr. High School. However, only one high-wage, high-demand occupation fits into this pathway: farm equipment mechanics, which is projected to have a 28% growth rate over the next decade, 11 projected annual openings, and a salary of $44,212 in Jackson and Josephine Counties. In addition to these CTE programs, students have access to support from the Future Farmers of America (FFA) CTSO in nearly every high school in the region.

No degree is required after high school to become a farm equipment mechanic, especially if a student successfully completes these CTE pathways in agricultural science and technology, but many of the same options are available to farm equipment mechanics as to other technicians and engineers. Additional research is recommended in order to determine the level of wage and demand careers that student completers in agricultural science and technology programs find.

Overall, the qualitative data supports the view that manufacturing pathways are successfully preparing young people for the workplace. One interviewee said, "RCC is being really progressive with tech and hands-on education." Another mentioned RCC's High Tech Center, which opened in winter of 2019 and is creating opportunities for high school students to earn certifications while still in high school. Other educators were proud of the certifications and qualifications that their students graduate with, making them ready to either work directly in manufacturing or go into a postsecondary program with an advantage. One educator said, "My students who finish with Metals 3 get their OSHA certification and American Welding Society certification." Others discussed the value of pushing these certifications to the high school level rather than making students wait until an apprenticeship or postsecondary degree programs to accomplish them.

In summary, while manufacturing is a high growth industry, the data show that the region hosts many well-regarded pathways for students to reach these careers.

STE(A)M

In addition to pathways that focus students into the careers above, there are several opportunities to build interest and skills in science, technology, engineering, (digital) arts, and math - STE(A)M - along the way. Though these might not focus on specific career paths, they provide exposure to students that could inspire future careers in the industries above.

SOUTHERN OREGON REGION

The following STE(A)M initiatives operate in the entire region: Oregon Science Project, Oregon Connections Nepris, Math in Real Life, Chief Science Officer (CSO) Program, Business Education Partnership, and Southern Oregon Careers in Trades Expo.

The Oregon Science Project (OSP) work is growing around the region and was started with rural elementary and middle schools in all 3 counties. It consists of professional development for teachers around STEM in the classroom, led by teacher leaders from Butte Falls and Talent Middle School.

Oregon Connections through Nepris is a virtual platform made available to all teachers in Southern Oregon for the use of providing career awareness and exploration and more. Southern Oregon is featuring an industry sector or two each month, scheduling local industry partners from all three counties to showcase their place of business and share about the pathway opportunities that lead to the jobs available. In addition, they invite post-secondary partners to provide sessions on the platform from the department faculty leads that align with the industry sector featured. Monthly educator trainings are scheduled and made available to all educators for the purpose of learning basic familiarity of the platform, registering for

upcoming live industry chats, and learning how to utilize catalogued video sessions for future use in the classroom. Students have access to participate during distance learning or in the classroom with their teacher. Additionally, industry panels for Chief Science Officers and other students are scheduled using the Oregon Connections Nepris platform.

Math in Real Life is a professional development opportunity for math and CTE educators to build skills in relating math to relevant industry use. Twelve teacher leaders from all three counties attended a Math Teacher Leadership Conference put on by Teachers Development Group (TDG) in March 2020. They have since worked with TDG to further their conversations and professional development at various levels. Some continue with monthly professional development. Heather Armstrong from Talent Middle School hosts a Math Professional Learning Community through the OSP work and Debbie Knapp from Prospect taught during the statewide Ed Tech Summit in August 2020 and during the fall statewide in-service day.

Additionally, the Southern Oregon ESD's teacher externship program is a partnership among Willamette ESD, industry, and the Association of General Contractors, sponsored by Southern Oregon ESD. Offering opportunities for educators to visit industry for free, including a meal, transportation, lodging, and taking place during their summer, this is a valuable opportunity for educators to lean about careers in order to share them with students.

The Chief Science Officer (CSO) program provides Annual Leadership Training, maps out a Leadership Project that promotes STEAM within school and community, meets with local STEAM Industry for input on their leadership plan, and provides opportunities to connect and receive mentorship for career exploration. Even though there are only a small number of CSO's per school, their leadership projects impact not just their schools but their communities. They collaborate within the region, with CSOs around the state, nation and internationally. They convene in both the Spring and Fall to work on their projects and meet with local industry. This is currently offered in seven schools, serving 25 students.

The Business Education Partnership offers internships to high school juniors in all targets other than transportation.

The Southern Oregon Careers in Trades Expo is offered every two years, providing hands-on interactions and experiences, showcasing professional and trades living-wage careers in construction, manufacturing, aviation, utilities, and more. The target population includes high school students from 6 counties, job-seeking veterans, military personnel and their spouses, 2nd chance populations, and job seeking referrals from public and private agencies and organizations no boundaries.

The SOESD Lending Library has a variety of STEAM high tech tools for educator and family borrowing as well as three mobile maker space kits – one per county.

Finally, the NIHF Camp Invention held summer camps during 2020 in four locations serving 121 elementary students.

JACKSON COUNTY

Jackson County hosts a variety of additional STE(A)M opportunities for students as young as elementary school.

For example, there are several afterschool and summer programs available for students, such as those offered through the Boys and Girls Club of the Rogue Valley in Phoenix/Talent, Robotics and Lego Clubs through Jackson County Extension Service and 4H, and the Southern Oregon Air Academy, whose programs serve students in both Jackson and Josephine Counties. Several career days are also available such as Careers in Gear for ninth graders in Jackson County and Ashland High School's Career Day. 71Five VoTech, based in Medford, focuses on reconnecting students age 16-24 to education and/or career opportunities, many of which fit within high-wage, high-demand pathways. Additionally, Jackson County is home to a variety of maker spaces including Crater Works and Talent Maker City. The latter was mentioned several times in the qualitative data, describing its collaborative and equity-focused efforts. One interviewee said, "Talent Maker City is

doing a lot of work. We work with them at the middle school level especially to reach out to girls and the Hispanic and Latino communities."

Finally, Talent Middle School houses two innovative options for students to explore an interest and connect to careers early on. One is the School of Design and Innovation and the other is the Outdoor Discovery Program. Both could be linked to future careers in STE(A)M high-wage, high-demand fields.

JOSEPHINE COUNTY

Josephine County also hosts a variety of additional STE(A)M opportunities for students as young as elementary school.

There are several afterschool and summer programs available such as those offered through the Boys and Girls Club of the Rogue Valley in Grants Pass and in Illinois Valley, which one interviewee said, "have a high level of engagement in STEAM/STEM programs, and the kids just gobble it up." Josephine County also benefits from the Southern Oregon Air Academy and is host to a makerspace, which is a partnership between New Bridge High School and Talent Maker City. An organization called Project Youth+ supports students with college and career planning at a high school level. Several career days are also available such as Grants Pass High School Career Day and Josephine County Career Highlights. RCC hosts a STEMathalon called Southern Oregon Skills, in which high school students are invited to campus to either compete or explore activities available in CTE pathways that are aligned to RCC programs connected to high wage, high demand jobs in the Rogue Valley. Local industry is invited to view and judge student competitions, meet and encourage students and showcase their own business. In 2020 for the first time, professional development was available for secondary welding instructors while students competed in a separate building. Additionally, they held Solid Works Certification testing, C-3 Electrical Certification testing and welding competitions.

Finally, Youth Pathways Partnerships (YPP) is based in Josephine County. This organization is a partnership working towards County-wide availability of work-based learning and educational internships. Their goal is to have 90%+ of Josephine County students access these experiences before graduation or GED completion by 2023. YPP is funded by the Board of Josephine Co. Commissioners, Grants Pass City Council, Cave Junction City Council, Grants Pass School District, Three Rivers SD, Partner Charter Schools, and Business/Individual funds. YPP was cited by an employer as the only reason they could host an intern to get beyond "grunt work," because they were able to work through any liability concerns.

KLAMATH COUNTY

Klamath County benefits significantly from OIT's footprint in the community. OIT hosts Lego, GIS/Geomatics, and Kids Hoo Code Camps for all ages.

High school students also can participate in one of many opportunities through OIT. Through a program called STEM&M, Mazama High School sophomores are fast-tracked through a rigorous college prep curriculum in one of four pathways: Science, Technology/Engineering, Math, or Medical. As a result, they meet OIT admission requirements and build community together. Secondly, through Klamath Union High School: Science and Math Academy, students are awarded the opportunity for co-curricular unpaid internships, to graduate with dual credits from OIT and KCC, to qualify for scholarships to OIT, and provided with preparation for acceptance into OIT. And thirdly, the Opportunity for Work and Learning in STEM (OWLS) program provides a unique scholarship opportunity for Oregon Tech-bound students who obtain at least 9 science, technology, engineering or math college credits through either a dual credit program, expedited on-site college classes or Project Lead the Way. Students who are admitted to Oregon Tech and meet the OWLS criteria receive a one-year $1,000 scholarship. If the applicant's college credit was awarded through Oregon Tech, they will receive a one-year $1,500 scholarship.

Post-secondary students also can benefit from OIT's influence. The Badger to Owl Connection is a new program designed to promote college access, affordability and bachelor's degree completion for more students. It is an accelerated full-time earned associate degree at KCC, followed by a completed bachelor's degree at OIT. What's new about this program are the supports and financial incentives to help students pay for college, continue their studies, and complete their bachelor's degree. Students who meet the required Bachelor to Owl Connection criteria will earn a first term tuition remission waiver at OIT, up to 15 credits of tuition value and a last term (prior to graduation) tuition remission waiver at OIT, up to 15 credits of value.

Finally, OIT students themselves have the opportunity to participate in the Multiple Engineering Cooperative Program (MECOP). By participating in the co-op, students in various engineering majors are guided through their coursework, participate in seminars and engage in two six-month internships with our business partners. The program instills in students a deep understanding of the theoretical and technical aspects of engineering. It also gives them exposure to different engineering disciplines, diverse professional workplace experiences, and state-of-the-art technology.

While this report focused on preparing students for high growth high-wage, high-demand careers locally in Southern Oregon, DIA recommends further research into nationwide growth industries, supporting student preparation for these roles wherever they might want to live.

PARTICIPATION IN PATHWAYS

With the intention of understanding who benefits from the existing pathways and opportunities described above, and who is left out, we have analyzed available data on CTE program completers, as well as student body data the two community colleges and two four-year universities within Jackson, Josephine, and Klamath Counties. The publicly available data is limited and incomplete.

The analysis below shows demographics of completers of CTE pathways and students in postsecondary institutions in the region. The available data show diversity of race, ethnicity, gender, and occasionally origin and socioeconomic status.

HIGH SCHOOL CTE PROGRAM PARTICIPATION

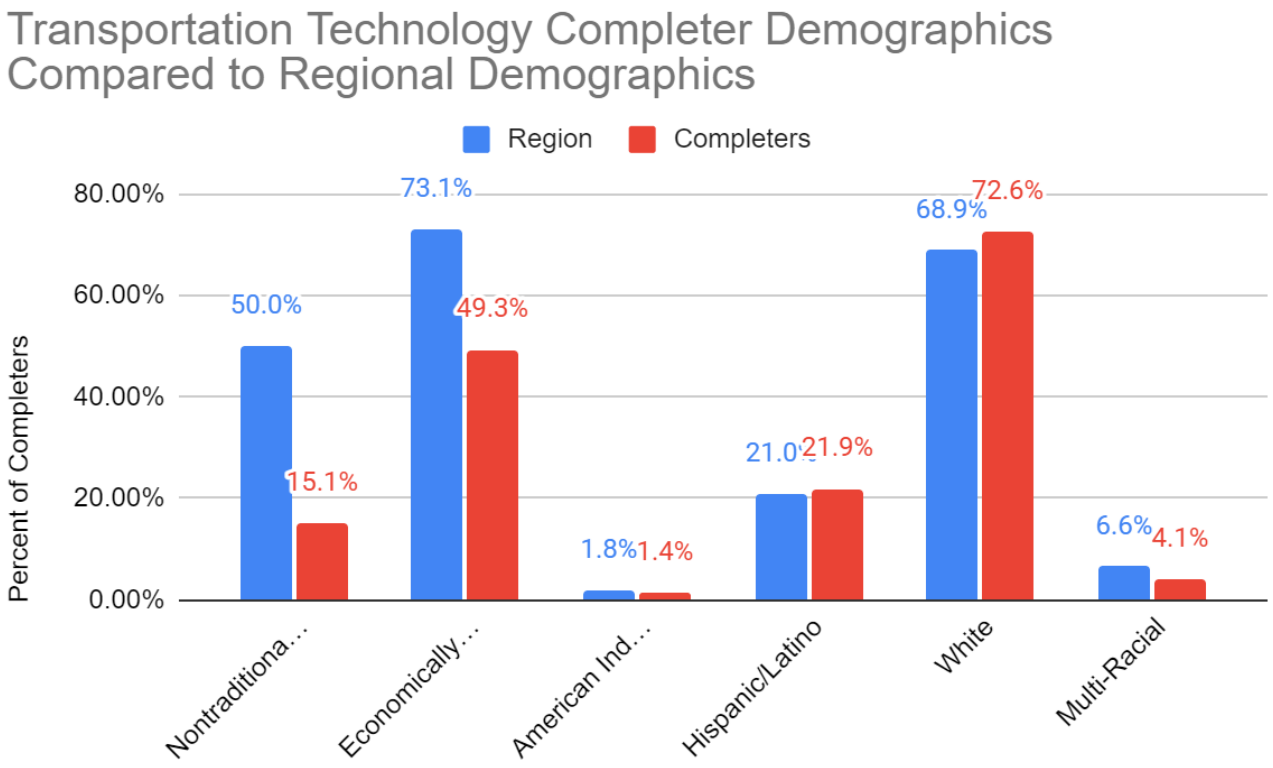
In analyzing the available data for 2018-2019 CTE Program Completers, we focused on the target populations of girls, low-income, and students of color, and compared their completion data to that of the region's school district population. Girls are the nontraditional participants in all but one CTE programs: health occupations. The state also tracks economically disadvantaged students by their participation in free or reduced lunch programs. The state tracks racial/ethnic data of completers as well.

The following is an analysis of the completion rate of these target populations compared to the regional population as a whole.

TRANSPORTATION TECHNOLOGY

There is data available for Transportation Technology from five high schools. With a total of 73 completers in 2018-2019, non-traditional gender students (female in this case), and economically disadvantaged students are underrepresented compared to the regional make-up. Females represented just 15% of the total, and economically disadvantaged students represented nearly 50%, compared to the school districts' 73.1% students on free or reduced lunch. Ashland High School did particularly well at including the target populations, compared to other schools with 31.6% of its 19 transportation technology students being female. And 100% of Phoenix High School's 6 completers were economically disadvantaged. That said, students of color represent less than 30% of the completers, which is on par with the region's racial demographics. American Indian/Alaska Natives at 1.4%, Hispanic/Latinos at 21.9% and Multi-Racial students at 4.1%.

Figure 5: Transportation Technology Completer Demographics compared to Regional Demographics

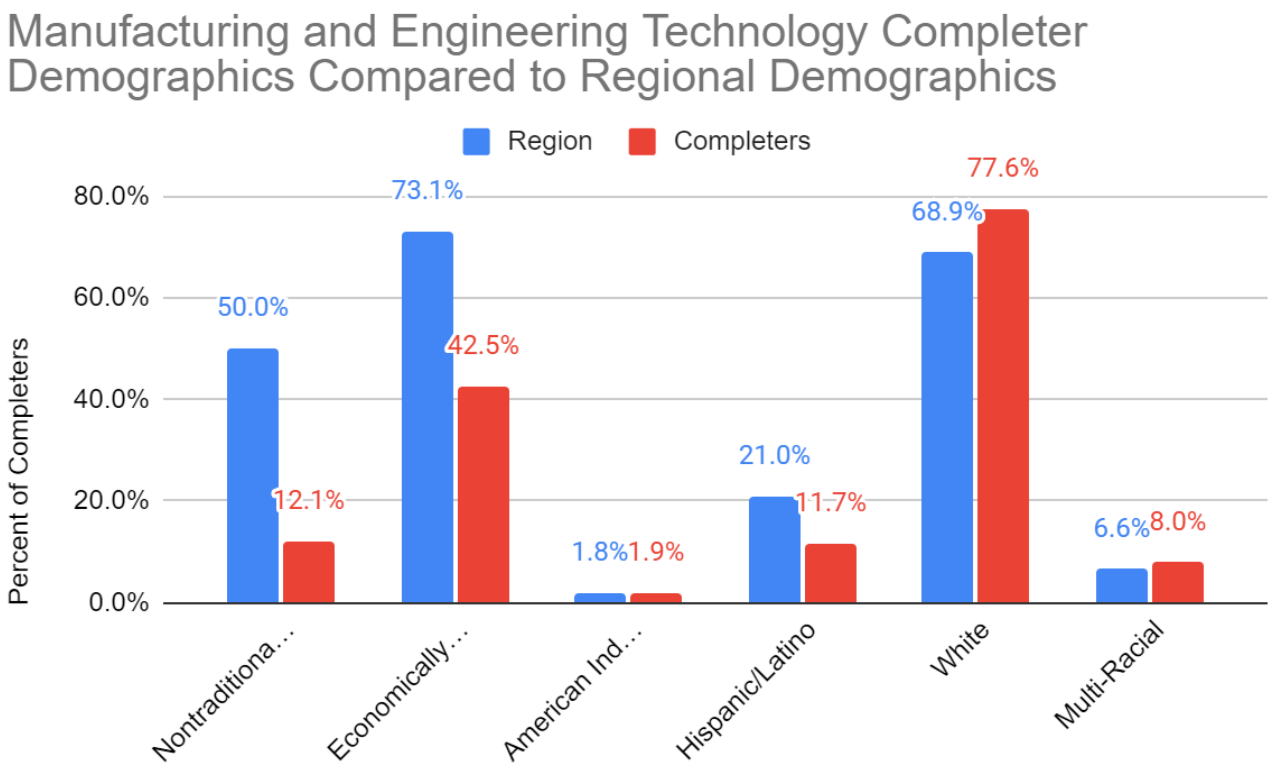


In summary, though students of color complete at a much lower rate than their white counterparts, they do so at a rate on par with the region. However, females and economically disadvantaged students complete at a much lower rate than their regional representation.

MANUFACTURING/ENGINEERING TECHNOLOGY

There is data available for Manufacturing/Engineering Technology from eight high schools. With a total of 214 completers in 2018-2019, non-traditional gender students (female in this case), economically disadvantaged students, and Hispanic/Latino students are underrepresented compared to the regional make-up. Females represented just 12.1% of the total, and economically disadvantaged students represented nearly 42.5%, compared to the school districts' 73.1% students on free and reduced lunch. Students of color represent barely 20% of the completers. The gap between students of color completers and the regional numbers comes primarily from Hispanic/Latino students, who completed at 10 percentage points less than their regional representation.

Figure 6: Manufacturing and Engineering Technology Completer Demographics compared to Regional Demographics



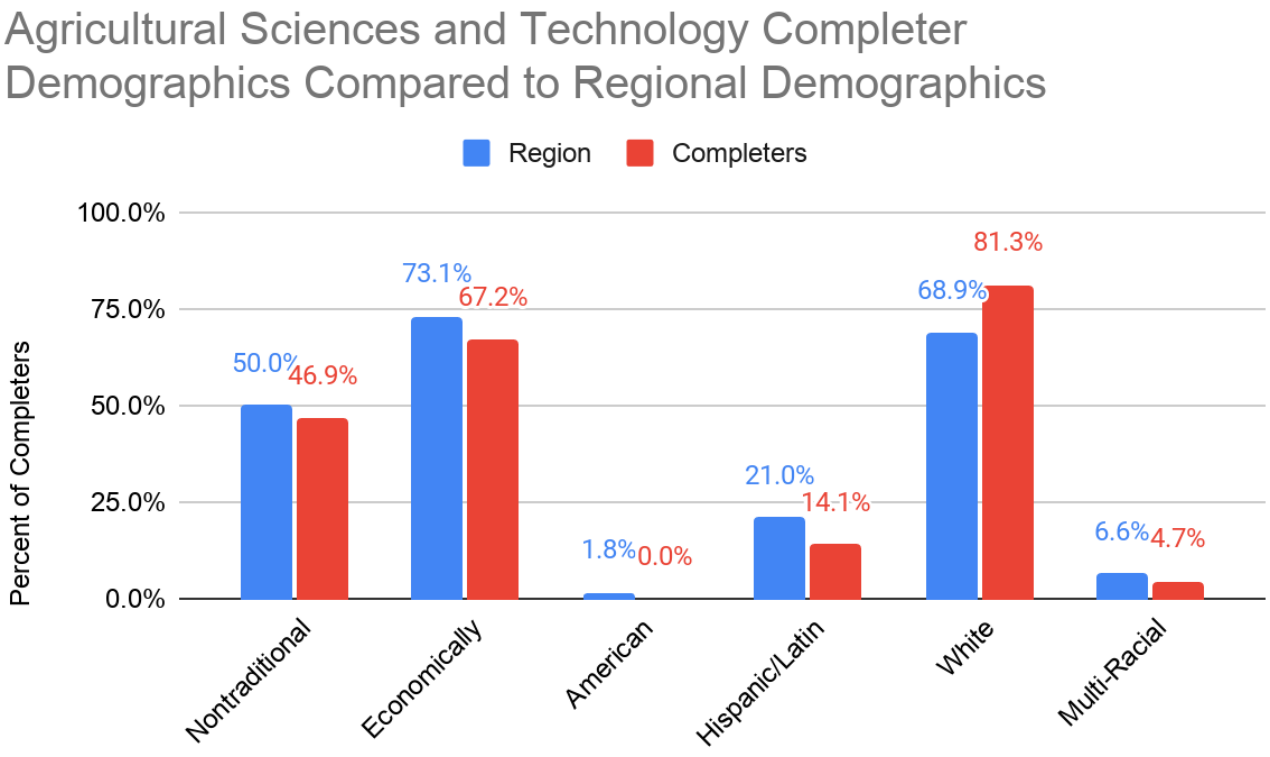
In summary, students of color complete at a much lower rate than their white counterparts, and Hispanic/Latinos at nearly half of their regional representation. Additionally, females and economically disadvantaged students complete at a much lower rate than their regional representation.

AGRICULTURAL SCIENCE AND TECHNOLOGY

There is data available for Agricultural Science and Technology from six high schools. With a total of 64 completers in 2018-2019, economically disadvantaged students, and students of color are underrepresented compared to the regional make-up. Females represented nearly 50% of completers, making gender less of a disproportionate represented group in this CTE Program. Economically disadvantaged students represented 67.2%, compared to the school districts' 73.1% students on free and reduced lunch. This is closer to the regional average than other pathways, and could be representative of the fact that most agricultural science and technology careers are not considered high-wage. Students of color represent barely 20% of the completers.

The gap between students of color completers and the regional numbers comes from all groups. White completers make up over 80% of completers, with Hispanic/Latino completers seven percentage points under their regional representation, Multi-racial students at two percentage points under their regional representation, and no American Indian completers.

Figure 7: Agricultural Science and Technology Completer Demographics compared to Regional Demographics



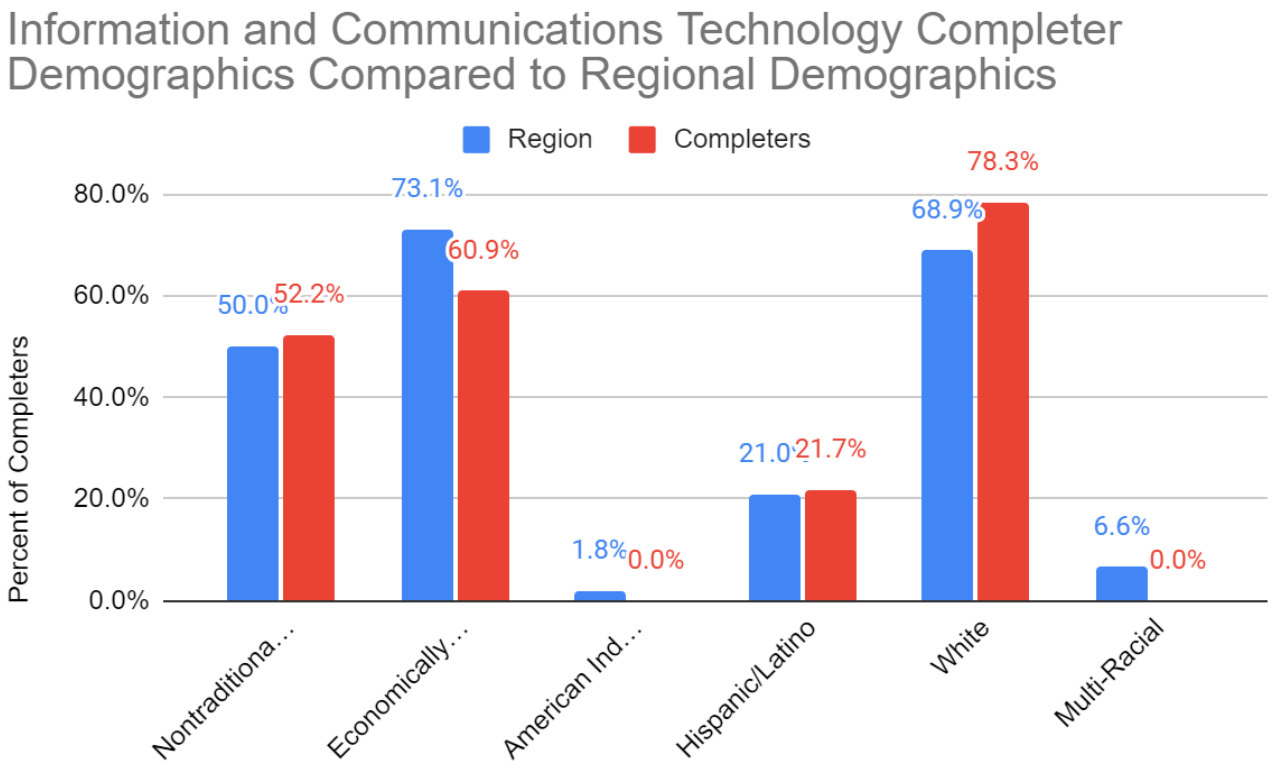
In summary, students of color complete Agricultural Sciences and Technology CTE Programs at a much lower rate than their white counterparts, and all groups at less than their regional representation. Additionally, females and economically disadvantaged students complete at a lower rate than their regional representation.

INFORMATION AND COMMUNICATIONS TECHNOLOGY

There is data available for Information and Communications Technology from three high schools. With a total of only 23 completers in 2018-2019, economically disadvantaged students, and students of color are underrepresented compared to the regional make-up. Females represented more than 50% of completers. Economically disadvantaged students represented 60.9%, compared to the school districts' 73.1% students on free and reduced lunch. Students of color represent barely 20% of completers.

The gap between students of color completers and the regional numbers comes primarily from the lack of completers who are either American Indian or Multi-Racial. Hispanic/Latino completers are overrepresented in this group by just under two percentage points.

Figure 8: Information and Communications Technology Completer Demographics compared to Regional Demographics



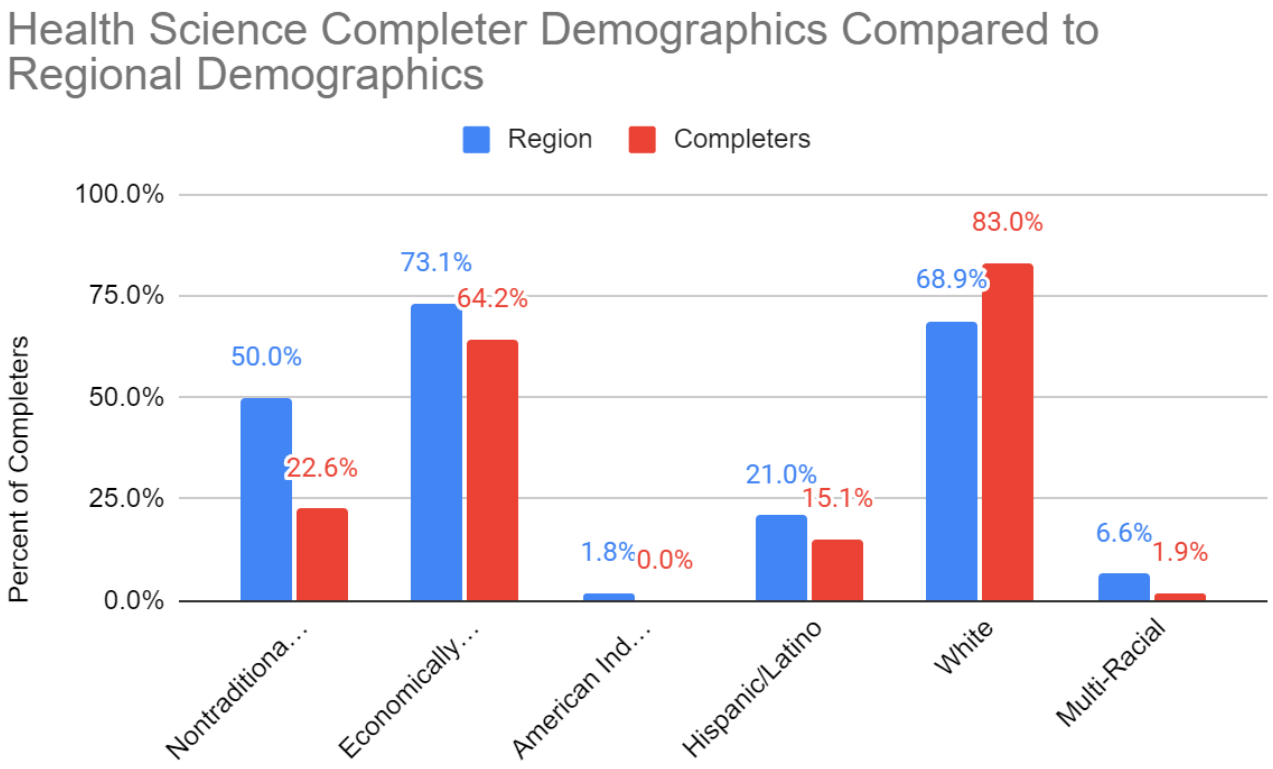
In summary, students of color complete Information and Communications Technology CTE Programs at a much lower rate than their white counterparts, and at less than their regional representation, except for Hispanic/Latino students, who complete at rates higher than their regional representation. Additionally, economically disadvantaged students complete at a lower rate than their regional representation.

HEALTH SCIENCES AND OCCUPATIONS

There is data available for Health Sciences and Occupations from two high schools. With a total of only 53 completers in 2018-2019, economically disadvantaged students, and students of color are underrepresented compared to the regional make-up. The nontraditional gender in this CTE Program is males, who represent 22.6% of completers. Economically disadvantaged students represented 64.2%, compared to the school districts' 73.1% students on free and reduced lunch. Students of color represent only 17% of completers.

The gap between students of color completers and the regional numbers came from all groups. Hispanic/Latino completers completed at six percentage points and Multi-Racial completers completed at 4.5 percentage points lower than their local representation. There were also no American Indian completers.

Figure 9: Health Sciences and Occupations Completer Demographics compared to Regional Demographics



In summary, students of color complete Health Science and Occupations CTE Programs at a much lower rate than their white counterparts, and all groups at less than their regional representation. Additionally, economically disadvantaged students complete at a lower rate than their regional representation.

CONSTRUCTION TECHNOLOGY

There is not enough data available to demonstrate participation rates in Construction Technology pathways from the 2018-2019 school year, as only one high school offered the program at the time and only four students completed.

POSTSECONDARY PARTICIPATION

Rogue Community College's 2019-2020 student body, according to its website,[16] looked like this. Just over 60% of students are white, and 60% are also women in both credit students and all students. Nearly half of all credit students are Pell Grant recipients, indicating a low-income population, and just over a quarter are confirmed first generation college students. The next largest ethnicity is Hispanic, followed by unknown.

Table 5: RCC Student Body Demographics 2019-2020

	Credit Students	All Students
Men	39.1%	38.5%
Women	60.0%	60.5%
Pell Recipients	47.9%	N/A
First Gen	27.1%	N/A
Not First Gen	36.0%	N/A
Unknown Gen[17]	36.9%	N/A
White	67.7%	61.7%
Hispanic	20.0%	17.4%
Unknown	3.7%	13.2%
Multiracial	4.3%	3.7%
Asian	1.6%	1.7%
Native American	1.2%	1.1%
Black	0.9%	0.8%
Pacific Islander	0.6%	0.5%
Total	**6,577**	**11,438**

RCC also released a report in early 2020, through its Institutional Research, Effectiveness, and Planning Department, called the "2018-19 Disproportional Enrollment Report," which was discussed at the February 25, 2020 Board of Education Meeting.[18] Relevant portions of the report are summarized below from the board meeting's notes, italics are my emphasis:

[16] Student Demographics, Rogue Community College, Nov 8, 2020. https://web.roguecc.edu/institutional-research-effectiveness-and-planning/student-demographics

[17] This number comes from students not filling out the FAFSA, which tends to either be because they are not aware of its benefits, in which case they are more likely to be a first generation college student, or because they would not receive financial benefit from completing it, in which case they are less likely to be a first generation college student.

[18] February 25, 2020, Board of Education Meeting Notes. Rogue Community College. https://web.roguecc.edu/sites/web.roguecc.edu/files/Sites/IREP/PDF/BOE-Reports/2020/IREPBoardReport_Feb2020.pdf

Gender: Analysis showed that the percentage of male enrollment continues to decline (from 43% in 2014-15 to 41% in 2018-19), but that *women are still under-represented in some traditionally male Career and Technical Education (CTE) programs and continue to make up the majority of traditionally female CTE programs*.

Race: Findings on specific races (i.e., Black, Native American, Pacific Islander, Asian) were inconclusive due to small percentages in both the college district and the student population. Though when these races were combined into a more general non-Hispanic people of color group, it does appear RCC enrolls a larger percentage than what resides in the community college service district.

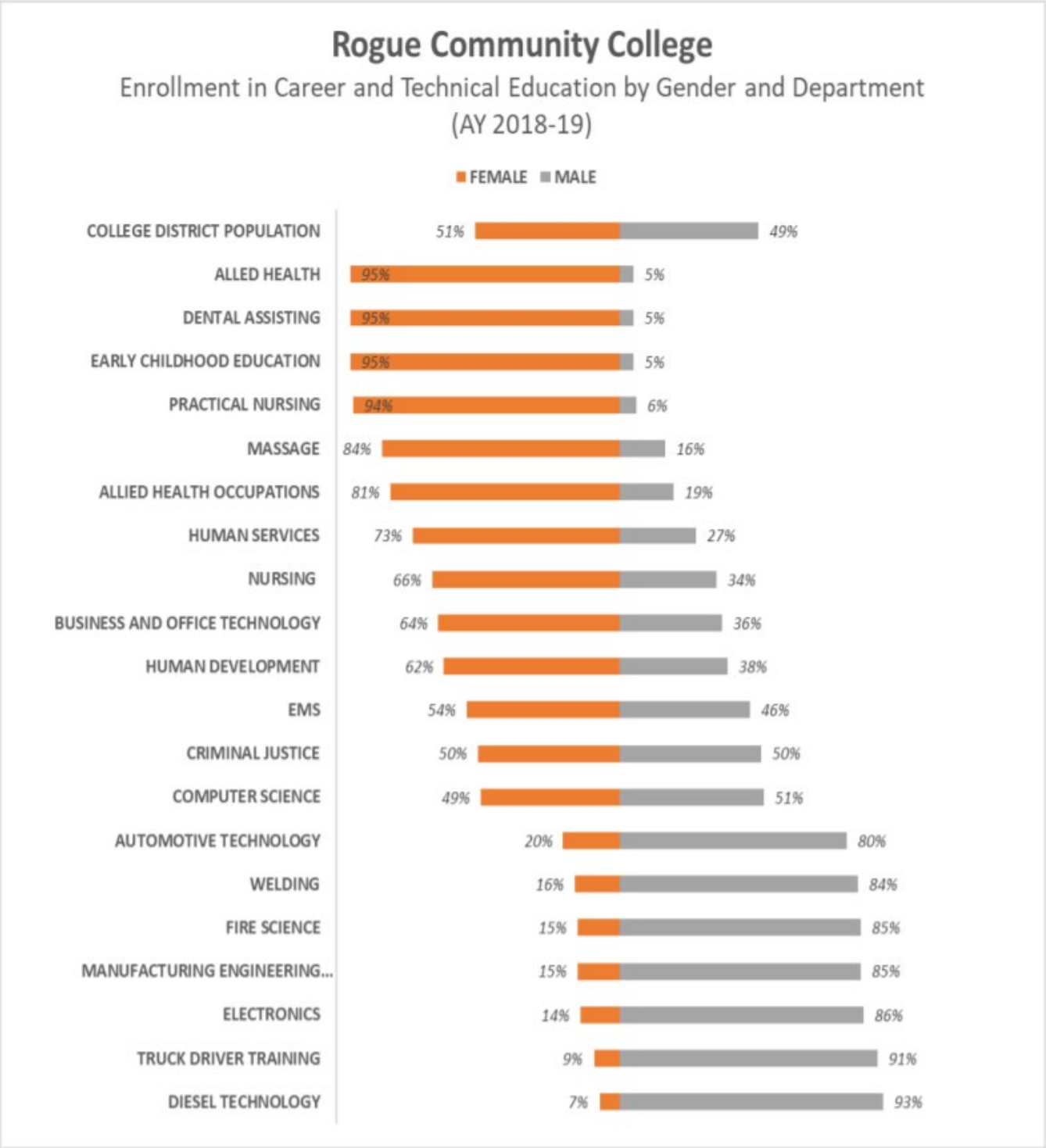
Hispanic Ethnicity: The participation rate of students of Hispanic ethnicity continues to increase and is proportionally greater than those which reside in the community college district. RCC's percentage of Hispanic/Latinx students taking 12-or-more credits continues to grow from 13.1% in 2014-15 to 17.5% in 2018-19.

Nation of Origin: Nation of Origin includes an examination of potential disproportional enrollment of nonnative English speakers who are not academically proficient in the English Language (i.e., English Language Learners or ELLs). Given the relatively recent transition to collecting English Language Learner information at RCC, and data sharing agreements with local high schools, Institutional Research is planning a more 'in depth' examination enrollment of ELLs. Early analyses indicate 3%-7% of students enrolled CTE courses are ELLs.[19]

This report provides evidence that "women are still under-represented in some traditionally male Career and Technical Education (CTE) programs and continue to make up the majority of traditionally female CTE programs." The chart below provides further evidence, especially in automotive technology, welding, manufacturing engineering, electronics, and diesel technology.

[19] Disproportional Enrollment Annual Report 2018-2019, Rogue Community College. https://web.roguecc.edu/sites/web.roguecc.edu/files/Sites/IREP/PDF/2018-19DisproportionalEnrollmentReport_E-Team_CR1142020.pdf

Figure 10: Rogue Community College Enrollment in CTE by Gender and Department



It also shows that students of color make up a representative proportion of the college's student body, and that in fact, Hispanic students enroll at a higher rate than the Hispanic population living in the community college district. It also notes that 28% of the Hispanic population of Jackson and Josephine Counties were living below the poverty line in 2017, almost double the estimate for non-Hispanic white residents, at 15%.

One interviewee commented on the inclusion aspect of RCC's services, "Once here, there is no mentor, coach, someone who follows them through their program. We're missing that factor both at the high school and RCC level. We don't have someone to motivate that person. First generation college students can get stuck. They don't know how to navigate, don't have study skills." First generation college students tend to come from lower income and other underrepresented populations. A lack of support for them once they begin a postsecondary pathway can result in a lower likelihood of completing their intended certificate or degree.

In summary, income and rural data are not available for students at RCC, but from race and gender data, only women continue to be underrepresented in traditionally male-dominated CTE programs, and overrepresented in traditionally female-dominated CTE programs.

Klamath Community College has published no equivalent report, but its degree completions and lower-division university transfer eligible course enrollment by subject are available through the Higher Education Coordinating Commission.[20] In nearly every high wage, high-demand subject area in the lower-division transfer eligible courses, Hispanic students have significantly higher enrollment proportions than their representation in the county's population over the past three years. American Indians, on the other hand, represent 3.6% of the county population and consistently represent 1-3% of enrollment in these courses during the same time period. Similarly, Hispanic students graduated with certificates and degrees at 19% and 18% respectively in the 2019-2020 school year, despite their 11% representation in the population, while American Indians graduated with 3% of the awarded certificates but none of the awarded degrees.

When it comes to gender, females represent more than 50% of every high-wage, high-demand subject area's lower-division university transfer eligible course enrollment, reaching 78% of biological sciences enrollment in the 2019-2020 school year. They also represented just over 50% of certificates awarded and over 60% of degrees awarded.

In summary, income and rural data are not available for students at KCC, nor is gender or race data available for specific CTE programs, so no conclusions can be drawn from the data about representation in KCC's pathways.

[20] Oregon Community College Data Mart, Higher Education Coordinating Commission. https://www.oregon.gov/highered/research/Pages/search-data.aspx

OIT's student body, according to the Common Data Set of 2019-2020[21] looked like this. Men are the majority in every category, as are white non-Hispanic students. Hispanic/Latinos are the next largest group hovering around 12%, followed by Asian and two or more races.

Table 6: OIT Student Body Demographics 2019-2020

	Degree-seeking first-time	Degree-seeking undergraduates	Total Undergraduates
Men	55.8%	54.1%	50.6%
Women	44.2%	45.9%	49.4%
Nonresident aliens	1.2%	2.3%	2.0%
Hispanic/Latino	12.3%	11.4%	11.5%
Black or African American, non-Hispanic	0.2%	1.7%	1.7%
White, non-Hispanic	72.4%	68.9%	67.4%
American Indian or Alaska Native, non-Hispanic	0.2%	1.0%	1.2%
Asian, non-Hispanic	5.3%	6.1%	6.7%
Native Hawaiian or other Pacific Islander, non-Hispanic	1.0%	0.6%	0.5%
Two or more races, non-Hispanic	6.0%	5.8%	4.9%
Race and/or ethnicity unknown	1.4%	2.2%	4.1%
Total Number	**416**	**3,568**	**5,178**

In summary, income and rural data are not available for students at OIT, nor is gender or race data available for specific high-wage, high-demand career pathway degree programs, so no conclusions can be drawn from the data about representation in OIT's pathways.

[21] Common Data Set, 2019-2020. https://www.oit.edu/sites/default/files/document/cds_201920.pdf

SOU's student body demographics from Fall 2019 show a majority female and nearly 60% white student population. Unknown is the next largest category with just over 17% of the student body, followed by Hispanic at just over 11%.

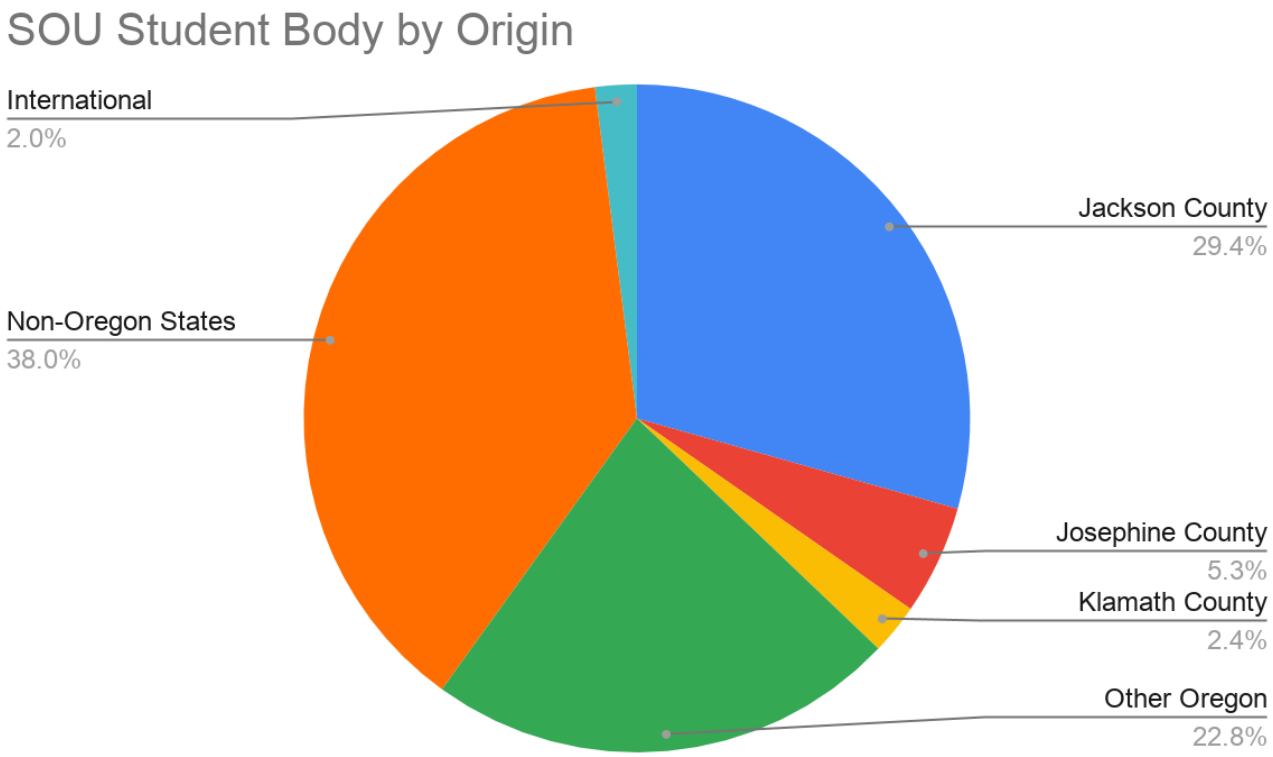
Table 7: SOU Student Body Demographics Fall 2019[22]

	Number	Percent
Female	3,463	57.6%
Male	2,208	36.8%
Unknown/Other	336	5.6%
American Indian/Alaskan Native	82	1.4%
Asian, non-Hispanic	151	2.5%
Black	110	1.8%
Hispanic	675	11.2%
Multiple	416	6.9%
Pacific Islander	51	0.8
White	3,491	58.1%
Declined to Respond/Unknown	1,031	17.2%
International	104	1.7%
Total Student Count	**6,007**	

Students at SOU come from more than the immediate surrounding region, so their demographics should be even more diverse than Jackson County's demographics. Jackson County is over 80% white, and SOU's student body is less than 60% white, so SOU's programs show a higher proportion of students of color than the surrounding region.

[22] Enrollment Report for Fall 2019 Demographics, Inside SOU. https://inside.sou.edu/assets/ir/docs/Enrollment_Data/Enrollment_Summary/Enrollment_Summary_Fall_2019.pdf

Figure 11: SOU Student Body by Origin[23]

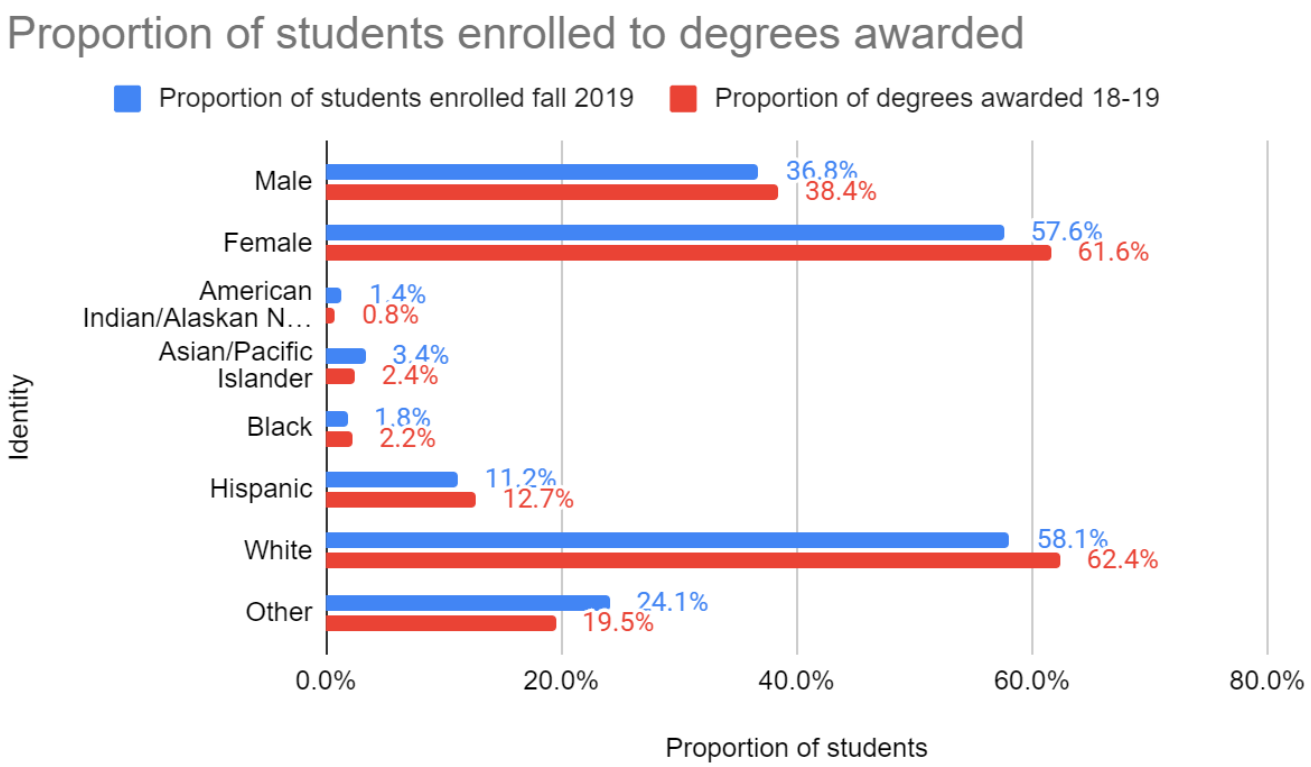


Proportion of degrees awarded tends to be a better measure of inclusion practices than simple enrollment diversity.

SOU's proportion of undergraduate degrees awarded by ethnicity and gender compared to their proportion of initially enrolled students is shown in Figure 12. The data show that Hispanic and Black, and White students receive degrees at a higher rate than their enrollment, but American Indians, Asian/Pacific Islanders, and Other (composed of unreported and multiracial students) receive degrees at a lower rate than their enrollment. This indicates that though SOU's enrollment data looks great, something happens along the way that reduces the degree attainment rate of American Indians, Asian/Pacific Islanders, and Other students.

[23] Fact Book 2019, SOU Office of Institutional Research, Southern Oregon University. https://inside.sou.edu/assets/ir/docs/Fact_Book_2019/Fact_Book_2019.pdf

Figure 12: SOU Proportion of students enrolled to degrees awarded[24]



In summary, income and rural data are not available for students at SOU, nor is gender or race data available for specific high-wage, high-demand career pathway degree programs, so no conclusions can be drawn from the data about representation in SOU's pathways.

[24] Fact Book 2019, SOU Office of Institutional Research, Southern Oregon University. https://inside.sou.edu/assets/ir/docs/Fact_Book_2019/Fact_Book_2019.pdf

BARRIERS

Because the primary purpose of this needs assessment is to ultimately advance opportunities for rural, low-income, students of color and girls in CTE-STEM, this section explores the barriers that prevent these target populations from accessing or completing these pathways. These take a variety of forms, so they are organized below into the barriers students face, the barriers educators face, and the barriers employers face.

STUDENTS

Students face barriers on their path to high-wage, high-demand careers from a variety of sources. Some are ubiquitous in this vast rural region and some are more pronounced for the target populations of the OCF grant: girls, low-income students, and students of color.

MOST STUDENTS

The primary barriers faced by most students in Southern Oregon are transportation, internet access, awareness, the stigma around the trades, and inequitable treatment.

Most students in the Southern Oregon region face transportation barriers due to the rural nature of the region. One interviewee said, “Kids are isolated and may not have support or transportation.” This is particularly salient when afterschool programs, summer opportunities, and potential career exposure activities are primarily located in the bigger cities and towns. Students life far from these opportunities, which can prevent access to them. One interviewee tried to explain how remote her school is, “When I’m teaching, I can see the deer wandering through, my first year here we saw a bear cub wandering through.”

Another common barrier in Southern Oregon is internet connectivity. For rural students, their access to programming is often virtual, especially during the pandemic. For that reason, a lack of strong internet connection can be a barrier. One interviewee said, “In Chiliquin and rural parts of Klamath, they don’t have wifi or broadband so to be in a program, they need good transportation or good wifi provided to them.”

Many students are also simply unaware of career options. One interviewee said, “There are a lot of layers that go into those higher paying careers. We talk about glass ceilings. A large part of that is exposing youth early on to actual careers. Educating our children for more of real life.” Another interviewee said, “I wasn’t a high schooler all that long ago, and remember that sometimes we get bottlenecked into things that we think are glamorous or that the media portrays as exciting, like Grey’s Anatomy.”

This lack of awareness is compounded for students who live in particularly rural or remote areas, like many do in the Southern Oregon region. One educator shared the depth of this reality for her students,

> We’re in a farming/ranching community. I have a student right now who was starting class, but said, “I have to go out and feed the cows,” then had to get a deer out of the fence on his way back in. I need to open up their eyes to what’s available, because they’re far removed from it. Trying to get their eyes open to what’s available is a challenge. Our students aren’t driving around or seeing it. They’re shut off to that. I need to make it known to them that they won’t brush it off - they can live here and make that wage that they’re not seeing in their families now. The majority of our students are in poverty. They don’t see the value in education - they don’t see it getting them what they want. I need to show them that this education will get them a job, and that those jobs could be something they want to do. And what they’re doing in the classroom is directly related to that.

Once they become aware of their options, the most pervasive barrier for students, mentioned by industry professionals and educators alike was the ubiquitous nature of college-going culture, at the expense of career paths like the trades. One interviewee said, "There's a stigma with CTE because of the college for all movement, that students who aren't on track for college feel like less of a person." Another interviewee added, "You don't need college to make a high wage or get a good career." As a result of the combined push for all students to go to college and stigma against the trades, many students end up spending money on college who might have preferred or been more apt to go into a career requiring only a high school diploma, a postsecondary certificate, or an associate's degree. One interviewee said, "When you focus on the college level, you really are giving a hand up to giving people from higher socioeconomic levels, who have more support and ability already. That's a disservice to those who come from lower SES, women, minorities."

Finally, while this report is not the place to focus on the nuances between equity and equality, existing research shows that culturally responsive pedagogy[25] (based in inclusive practices) is critical to meaningful learning and linked to a wide range of positive outcomes such as academic achievement and persistence, improved attendance, greater interest in school, among other outcomes.[26] In practice, connecting learning to a student's background knowledge and experience shapes comprehension. In other words, all students benefit when their identities are recognized and honored in the process of learning.[27]

The qualitative data reveal that many (though not all) educators in the region do not understand or practice culturally responsive pedagogy. This shows up as "color blindness" or a perceived form of non-discrimination.[28] For example, one interviewee said, "Focusing on students of certain populations in itself is discriminatory: that's just a mindset." Another interviewee said, "I don't treat people differently based on those demographics differently. For me it wouldn't feel right to

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[25] Gloria Ladson-Billings introduced the term culturally responsive teaching over two decades ago to describe a way of teaching that engages learners whose experience may be different from the mainstream. She proposed three goals, on which these practices are grounded: teaching must 1) yield academic success, 2) help students develop positive ethnic and cultural identities while simultaneously helping them to achieve academically, and 3) support students' ability to "recognize, understand, and critique current and social inequalities." Gloria Ladson-Billings, "But That's Just Good Teaching! The Case for Culturally Relevant Pedagogy," Theory Into Practice, 34, no. 3 (1995): 476; Gloria Ladson-Billings, The Dreamkeepers: Successful Teachers of Black Children (San Francisco, CA: Jossey-Bass, 1994); Gloria Ladson-Billings, "'Yes, But How Do We Do It?' Practicing Culturally Relevant Pedagogy," in Julie Landsman and Chance W. Lewis, eds., White Teachers/Diverse Classrooms (Sterling, VA: Stylus Publishers, 2006): 162–177; and Gloria Ladson-Billings, "Toward a Theory of Culturally Relevant Pedagogy," American Educational Research Journal 32, no. 3 (1995): 465–491.

[26] Kristan A. Morrison, Holly H. Robbins, and Dana Gregory Rose, "Operationalizing Culturally Relevant Pedagogy: A Synthesis of Classroom-Based Research" Equity & Excellence in Education 41, no. 4 (2008): 433–452, source; Christy M. Byrd, "Does Culturally Relevant Teaching Work? An Examination From Student Perspectives," SAGE Open 6 (Summer 2016): 1–10; Brittany Aronson and Judson Laughter, "The Theory and Practice of Culturally Relevant Education: A Synthesis of Research Across Content Areas," Review of Educational Research 86, no. 1 (2016): 163–206; James L. Rodriguez, Evangelina Bustamante Jones, Valerie Ooka Pang, and Cynthia D. Park, "Promoting Academic Achievement and Identity Development Among Diverse High School Students" High School Journal 87, no. 3 (2004): 44–53, source; and Thomas Dee and Emily Penner, The Causal Effects of Cultural Relevance: Evidence from an Ethnic Studies Curriculum (Stanford, CA: Stanford Center for Education Policy Analysis, 2016).

[27] "Understanding Culturally Responsive Teaching." New America. https://www.newamerica.org/education-policy/reports/culturally-responsive-teaching/understanding-culturally-responsive-teaching

[28] Ullucci, Kerri and Dan Battey. "Exposing Color Blindness/Grounding Color Consciousness: Challenges for Teacher Education." Urban Education. Vol 46. Issue 6. Pages 1195-1125. July, 18, 2011.

treat people differently for shade of skin or gender." A third said, "People of color… I don't like using that word, because we're all sort of the same."

As a result, many students miss out on this opportunity to connect their identity with their learning, which presents as a barrier in itself.

GIRLS

Girls face a unique barrier toward high-wage, high-demand careers outside of healthcare, because of the messaging and perception of girls in STEM. This is internalized by students and often reinforced by influential role models. A manufacturing educator said, "I have zero girls in Metals 2. One girl came up to me, she said, 'I really wanted to take your class as a freshman, but my counselor said I should probably take foods because welding is for boys.'"

One interviewee from the construction industry said, "People have the perception that this is a male dominated industry and that's how it's going to be. Girls are taught at a young age that we're not going to be good at math. Well, actually, I have a degree in mathematics now!" Another said, "Women don't know this is an option. I expect we'll have an influx in the future, once we let them know this is something they can do."

LOW-INCOME STUDENTS

In addition to the barriers that all students from rural areas face, low-income students also have additional challenges including: the networking gap, finances, and operating from a place of poverty.

Pervasive in the qualitative data was the sense that career opportunity is based on who you know in the region. One interviewee said, "So much work around here comes from who you know." Educators and employers alike mentioned that the path to a career is through family connections. One interviewee said, "The people who already have a connection to those industries are those who continue with it. There isn't any broader base. Any kids who don't have parents already associated in industry are very unlikely to go into industrial, high tech, or science industry." The same is true of construction, "Most of our employees, their dad or someone they know did construction. There's a lot of word of mouth. They often have worked under their dad when they were younger. They come to work for us when they're tired of working with their dad, like one who became a foreman pretty quickly. He had pre-exposure to the industry."

This is a challenge for low-income students, whose parents tend to have fewer connections and less time to engage with these opportunities. One interviewee said, "There are bubbles - those who have and those who don't have, and there seems to be very little cross-over. Students have to think about going beyond high school both from school and home, and if the parents haven't gone on to college, neither do the students."

One interviewee said, "The youth who are going to engage in available programming are those whose parents are able to take time out of work to pick them up, provide them with a car, whose parents spend more time pushing them toward those kinds of experiences." Another interviewee said, "In a rural area, if your parents don't know someone in those careers, you're not exposed to it from your parents. So it becomes the sole responsibility of your teachers to expose students to all these different career options."

Low-income students are also seldom able to pay for the upfront costs for some of these career pathways. Basic necessities like work boots for construction or a computer for software development can be barriers in themselves. Additionally, the cost of following through with a pathway into community college or an apprenticeship can be prohibitive for low-income students. One interviewee shared that course fees for a manufacturing degree are more than double that of a liberal arts degree at KCC. Another gave the breakdown of the cost to become a licensed construction worker, "To get their license,

they're looking at about $1000. $150 for testing materials, $60 for test, $250 application fee, pay for insurance and bond as well. Those are paid for regularly, but include a lump sum at the front. For anybody coming out of high school, that could be a big barrier."

And finally, low-income students are often just trying to survive and do not have space in their lives to pursue high-wage, high-demand careers. One interviewee said, "There are a lot of social economic issues - generational poverty, generational trauma." Another said that some students are in "survival mode."

Another interviewee referenced the recent devastation from the fires in fall 2020, "The 2400 homes that were just destroyed in our community. What we're dealing with in our community, and people living day by day rather than seeing a future. Especially kids just trying to survive, especially in this distance learning format. These are big challenges that aren't going to last forever, but that's a big barrier right now."

STUDENTS OF COLOR

Students of color in rural Southern Oregon have additional barriers to face: a lack of role models, and for those from migrant families or recent immigrants, language is a barrier toward high-wage, high-demand careers.

In a region with a low proportion of people of color, and in industries that already underrepresent people of color, students of color in Southern Oregon lack career role models. One interviewee said, "They need to see themselves in those careers. We need girls and the Latinx population to have an adult role model."

Additionally, Hispanic students face barriers around language. One educator said, "We get our Latino family liaison involved in that recruitment. It could be a language thing between the parents. A lot of our Latino students' parents don't speak English, so they're not as involved in the school." Another interviewee familiar with the licensing for construction trades said, "The text and the test have a very poor translation from English to Spanish. There are differences between the textbook version of Spanish and what's actually spoken." When students struggle with language barriers toward these careers, they are less likely to pursue them.

EDUCATORS

Despite educators' best intentions, they face barriers to empowering students to access these high-wage, high-demand careers. The primary barriers are a lack of applied learning or career-orientation in the state standards, scheduling, and sheer time constraints.

LACK OF CAREER-ORIENTATION IN THE STANDARDS

Educators are bound by innumerable state, district, and school requirements that are intended to provide a well-rounded education and prepare students for life after high school. However, many educators lament the lack of applied learning and career-orientation in their work. Some have figured out creative ways around it, but many struggle with this as a barrier.

One educator said, "I have to teach to math standards. There's nowhere in the standards for me to talk about what businesses want. It's not a math standard. It's a life standard. There's no room in education room for that. Everything is geared toward English, math, history… so trying to get this integrated to our education system is the hard part."

Another said, "I struggle with the fact that education separates itself so much from the real world. We're not allowed to mark down assignments for being late. That's a total disconnect from the real world. Those employability skills that we teach in CTE are only in CTE. And we have to fight to be able to teach them."

Educators recognize that connecting education to careers draws students in. One educator said,

> In my personal opinion, school is not a place for everybody. It's become so binary and serial in producing people with knowledge but not connected to anything. If knowledge is not connected to something, then you have no reason to do it. If a person is not connected to something with purpose or passion, then what's their reason to stay? We've disconnected the hands-on and physical things, it's become so much about book learning, that you're disconnecting from 40% of the kids.

SCHEDULING

Educators also face scheduling barriers. High school master schedules are often designed to graduate the most students through typical pathways. However, that often leaves CTE programs in elective time slots, at odds with electives like music, foreign languages, or art. One educator said, "They may want to [take my class], but school schedules and work schedules... It can be tough negotiating all that."

TIME

Educators also face the simple barrier of not having enough time to built out the industry connections, student relationships, or career exposure coordination, amid their already-packed day. One educator said, "I'm working 10-12 hours/day, then I coach football twice a week. And I know that these folks at corporations work just as much. It's hard to form partnerships when you're constantly playing phone tag." Another said, "Education is becoming a life-encompassing thing."

Another educator described the plight of many school counselors, "The systems are overwhelmed. School counselors are a great example. National average is 1 school counselor to 300+ students. One person can only physically take on a certain sized case load. Those students are less likely to reach out on their own. They need somebody to say, 'hey, are you interested in this, or did you even know this was available?'"

EMPLOYERS

Meanwhile, employers face additional barriers to advancing opportunities for students in these high-wage, high-demand careers: they primarily relate to liability and the cost of new hiring or replacing employees.

LIABILITY

In many manufacturing and construction companies, insurance prohibits employees under the age of 18 to use certain equipment or machinery. For some firms, that prohibits their ability to provide meaningful internships, shadowing, or even visits for young students, because the vast majority of the work involves those machines.

One employer complained, "You can't even use a box knife until you're 18 at a grocery store." A carpentry employer said, "If they're under 18, they can only use an iron and vacuum cleaner. They can't use sanders or other tools. We've had numerous high school students who work during the summer doing grunt work."

HIRING AND RETAINING A STRONG WORKFORCE

A survey conducted by the Rogue Advanced Manufacturing Partnership (RAMP) in 2016 resulted in 43 unique company responses. The respondents clearly name workforce issues as barriers and concerns for their future.

Table 8: RAMP Workforce Issues[29]

Workforce Issue	Percent Concerned
Finding qualified applicants	100%
Maintaining a skilled workforce	100%
Work ethic	100%
Lack of work readiness	98%
Motivated employees	95%
Quality of work	90%
Keeping employee skills up-to-date	88%
Aging workforce/succession planning	64%
Positive drug test/use	61%

As a solution to this, RAMP developed an Employability Matrix in collaboration with several districts and employers. It has since been distributed widely, though usage and success in improving the incoming rating of employees could be the subject of further research, as it is unknown at this time. See Appendix 4: Employability Skills Rubric.

Several employers interviewed discussed positive drug tests as a barrier for them to hire and retain students. One interviewee said, "Getting kids to pass the drug test. It's legal, but where's the balance? That's a hard problem for employability in the region." Another said, "The legalization of marijuana. It's not ok to smoke it and still work. Our insurance carriers say no. When using power tools, you need to have a clear mind."

QUALITIES OF A SUCCESSFUL PATHWAY

The qualitative data provide a strong picture of qualities to increase access toward successful pathways to high-wage, high-demand careers in these growth industries of Southern Oregon. The key qualities are listed below:

1. Pathways should be pervasive such that it incorporates applied learning and career exposure for all students starting from an early age and continuing without interruption until employment.

2. Pathways should be systemic in that they are integrated into the expected standards of schools and not considered extra work for educators or extracurricular for students.

3. Pathways should incorporate strong relationships between students and educators, educators and employers, and students and employers.

[29] Consolidated Presentation to K-20 Educators, Workforce Survey, Rogue Advanced Manufacturing Partnership, September 9, 2016.

4. Pathways should address known student barriers for all students in the region, and especially girls, low-income students, and students of color.

5. Pathways should address known employer barriers such as liability, a drug-free workplace, and up-to-date curriculum.

1. PERVASIVE APPLIED LEARNING AND CAREER EXPOSURE

Interviewees shared the desire to begin career exposure and applied learning opportunities at middle school or earlier. One said, "I like the idea of career exploration as young as middle school." When students are not exposed to applied learning opportunities in middle school, one educator said, "That creates a big problem when they get into high school, because kids haven't had those hands-on experiences. The foundation's the same, but we don't do CAD. Good luck kids… why would you choose this as a career path if you have no experience with it?"

In addition to starting early, interviewees stressed the importance of building awareness of the great variety of careers. One interviewee said, "Continuing to communicate with young people that these jobs exist and what they look like. There's a great amount of technology that's been instituted. Someone's preconceived idea about manufacturing jobs is not necessarily what it is. It's probably less manual and more interesting." By allowing students to explore different careers, they have the opportunity to find their fit. One interviewee said, "schools should expose them to all these different things so they can find where their gift is. Everyone has one, it's just in different areas. Mine is coding, another's might be welding."

Once students are exposed, interviewees share that the hands-on nature of applied learning is vital to a successful career pathway. One interviewee said students need "classes where they get their hands dirty." An employer added that they must get "beyond basic theoretical knowledge." Another employer shared that this is where hiring organizations can step in, if they are "willing to allow individuals to shadow and be immersed in these programs so they get real-time experience."

Participants also emphasized that once a pathway is chosen, we need to ensure its continuity straight through to employment. One interviewee said, "It would be good for our community college also to be more active. There are times I think they get it, but they don't realize that we need CTE first, for them to have a successful CTE program, too." Another interviewee from the community college perspective shared that there is a low level of "understanding what pathways are constructive at the high school level that are aligned at the community college level for dual credit courses. There's a lack of knowledge at the high school level of what are these courses, how to get in, and why they're important. That kind of conversation hasn't been built up yet." Another community college representative said, "Our welding program does a great job because there's welding at the high school level. Manufacturing does well because there's robotics at the high school level." Without those connections, students get lost along the way.

2. SYSTEMIC AND INTEGRATED

Addressing some of the educator barriers, interviewees suggest that career pathway opportunities also need to be a systemic part of our education system and integrated into the educator job and student school day, such that it does not become an additional burden to either of them.

Interviewees explored one way of ensuring broad career exposure: making some of these opportunities required rather than an elective for students. One interviewee said, "When I was growing up, shop was required. A lot of people found their passion doing something they were required to do. I think kids are missing out on that now."

In a systemic and integrated career pathway, career exploration would be built into statewide standards for education, holding educators accountable to career-connected learning indicators, rather than expecting it to happen in nearly non-existent free time. One interviewer said this requires, “Coordination of classes and organized set of course offerings.”

3. STRONG RELATIONSHIPS

Successful career pathways, especially in primarily rural settings like Southern Oregon, are built on strong relationships among all of the players: students, educators, and employers. One interviewee said the success of the pathway depends on “who’s leading it, teachers who can connect with kids.” Another said it requires, “Treating students like employees and adults, which doesn’t happen in the high school environment very much. Giving them the opportunity to shine and expecting more rather than less.” And another said, “In my case, that’s easy, it’s relationship-based.” The other strong relationships required are between educator and employer.

4. ADDRESS STUDENT BARRIERS

A successful career pathway also addresses the student barriers described in the previous section (Students). In practice, that looks different for each student, but generally follows an equitable support philosophy, supporting students according to their unique needs. Some specific ideas are shown below, though students facing these barriers often face compounded challenges that cannot be solved with a silver bullet.

Reducing the stigma associated with the trades starts with changing mindsets. One interviewee said, “We need to change the mindset that college is for everybody. It means taking some of those kids who found careers in the trades and bringing them back and putting them in front of students to see the opportunity.” This means building awareness in the influential adults in students’ lives of the current reality of different kinds of careers associated with classes students take in school. Another interviewee said, “We need to bridge the gap in understanding. People still convey to me that STEAM/STEM are luxury classes - that we just want kids to graduate, we don’t have time to focus on this. In reality, this is a way of learning and keeping kids engaged.”

For students from low-income families, struggling with transportation, internet access, or course fees, one interviewee suggested, “Pay students for their time. We need to incentivize it so kids are more interested in taking their education to the next level through experiential learning.”

For students who do not see themselves in these high-wage, high-demand careers, it takes educators and employers diversifying their workplaces and leading by example. One healthcare employer said, “It starts with leadership and me. When I look at my executive team, we have an equal balance between male and female. I don’t believe in the boys club, where you have an all male leadership or executive team.” Similarly, a female educator shared how simply by teaching an engineering class and coaching the math team, she increased the proportion of girls participating, “My first class, engineering, I had one girl out of fourteen students. I just hang on, because eventually they say, ‘Hey there’s a woman teaching that class, so it’s ok to take that class.’ I took over coaching the math team, which was all boys. Within three years, it became half girls. Just the idea that I’m teaching it, we get more girls involved that way.” The next step is ensuring students have the chance to see those careers in action as well as role models in those careers.

And finally, interviewees highlight that the pathway to these careers is not straight, that students will need to advocate for themselves along the way, fail, and try again. One educator said,

> Teaching students to advocate for themselves is something we can and should do. We can teach students to persevere. I think we can model the messiness of learning, which is what life is. In a high tech job, we don’t know the answers. There’s confidence in knowing that you can figure it out. Those are learned

behaviors and belief systems, and we need to focus on that. Give them opportunities to fail. You fail forward and reflect.

5. ADDRESS EMPLOYER BARRIERS

Finally, successful career pathways address employer barriers as well, particularly liability and hiring and retaining a strong workforce.

One organization, Youth Pathways Partnership, extensively researched how to legally provide internships to students under 18 in a way that allows them to engage in hands on practice learning relevant skills. These internships are unpaid and instead, the student receives graduation credit, skills learned to add to their resume and experience interacting with employers through the entire process – application to selection. An employer who worked with Youth Pathways Partnership said, "When we were approached last year by an organization that they have funding from the state under 18 while they're in school and they're allowed to use power tools, well that was great. They could learn the basics of what it takes to do this kind of work. That's beneficial. Sometimes you don't know until you try it. I can't have an intern if they're under 18, otherwise." If this model could be expanded or replicated, that would build out opportunities for employers to train future employees while they are still in high school.

Additionally, employers value pathways that provide both up-to-date industry content and relevant soft skills for future employees. One interviewee said, "The curriculum now needs to change as business changes. It's rapid. By the time you print textbooks, it's obsolete. We need to make it more relevant."

POSSIBLE SOLUTIONS

The good news is that the qualitative data show a sense of hope, confidence in the region's future, and willingness to roll up sleeves to do the work. One interviewee said, "The commitment is already there. But there's a stubbornness that's been created from these long-term biases." Allow this needs assessment to provide the data to break those biases and lean into action. Below are the possible solutions that fit the qualities of successful career pathways, as identified by interviewees and participants in the Community Dialogue which took place on December 7, 2020.

1. MORE EXTENSIVE INTERNSHIPS

The data show that more extensive internships and job shadowing experiences would improve career outcomes in the region. Incorporating this possible solution would meet the most qualities of a successful career pathway.

Internships consist of applied learning and are by nature, an opportunity to gain exposure to career without committing to it. They would build on the strong local relationships, which are a strength in the region. One interviewee said, "as a small region with a lot of small business, it is easier to reach that person with decision-making capability. So, I can go to the owner of let's say, Lippert's Carpet in the skilled trades arena, get to the business owner and say, 'we understand the risk and we're willing to take them.' The small nature of the community is one of the most important factors."

The other key relationship is between the student and their supervisor or employer. Building that early helps to address the network gap. One interviewee said, "We know that the way people find work is through interpersonal connections. 70% of jobs are found through a warm handoff. The most effective way to get youth into career fields is to get them actual experience in that career field before they start work. I'm passionate about youth internships."

More extensive internships would also address many of the student barriers, if implemented well. If transportation or internet is paid for and coordinated for students, if industry representatives mirror student participants, if students are paid

for their time, and if they are given the opportunity to participate from an early age, internships or job shadows would address most student barriers.

Internships, if done well, would also address employer barriers, building experience so students can be more prepared for the workforce, and resolving liability concerns.

However, more extensive internships would not directly address access for the target populations or educator barriers, unless they are made mandatory as part of the school day, and an external entity or additional staff person were brought on to coordinate. Without those features, internships would continue to be only for those who have connections, and an additional burden on educators' time.

One example of an organization to emulate is Youth Partnership Pathways, currently operating in Josephine County.

2. VIRTUAL CAREER EXPOSURE

A second possible solution is virtual career exposure. Incorporating this possible solution meets many of the qualities of a successful career pathway.

Virtual career exposure can rarely involve applied learning, but it does allow students to learn about careers from wherever they are. If integrated into the classroom experience, especially with support from an external entity, this could prove pervasive and not add substantially to educator workloads.

This leverages the student-teacher relationship and builds educator-industry relationships at the same time. It also addresses many student barriers in that transportation is not needed, and awareness can be built from an early age. One educator said, "What we're doing in Nepris - it's a career video that shows a teacher what it takes to be a person in that career. Those are the things that really ignite students to try something new." If effort is made to ensure industry representatives mirror student participants, this could support the target populations' ability to envision themselves in these future careers. It could surface and mobilize role models in a way that would not overtax local industry people of color or women. This also addresses some of the employer barriers in that no student is on-site, allowing them to skirt any liability.

However, virtual career exposure continues to be omitted from state educational standards, making these efforts above and beyond the expectations of classroom educators. Until it is truly baked into the standards and graduation requirements, this will not be an ideal solution.

One example of this happening in practice is Oregon Connections, operated through Nepris, and distributed to Southern Oregon school districts through the Southern Oregon STEM Hub. Currently, every educator has access to a platinum license. Introductory educator trainings are offered monthly. Southern Oregon STEM Hub features at least one industry sector each month as well as post-secondary partners.

3. PARENT EDUCATION PROGRAMS

A third possible solution is to implement parent education programs. Incorporating this possible solution meets some of the qualities of a successful career pathway.

Though this solution does not create direct opportunities for applied learning, cannot possibly be required, and does not address educator or employer barriers, it does lead to expanded career exposure by leveraging the parent-child relationship, which has been shown to be among the most influential in a student's career decisions.

If transportation or internet is paid for and coordinated, and any industry and education representatives mirror parent participants, this could build support and awareness around career opportunities for parents in the region, ultimately influencing students as well. This is an idea that is currently in development by staff at RCC, who are "building a support system that starts at a high school level with parent buy-in. I got the ok to develop a parent workshop that talks about CTE programs and high-paying jobs, so they understand why this route of education is really important. It's just a series of a few weeks, where parents explore programs, meet RCC staff, industry partners, and have that motivation to motivate their child. I also plan to have that both in English and Spanish, so I can have more Spanish-speaking parents and more Latinos in these programs."

Another method of evangelizing parents for these high-wage, high-demand careers includes developing flyers and other communications materials targeted at them, particularly in Spanish to address a known barrier. Another suggestion is a "Bring your parent to school day," building interest in these careers and exposing parents to potential opportunities for their children.

4. TEACHER AND COUNSELOR EXTERNSHIPS AND PATHWAY MAPPING

The fourth possible solution is to build knowledge for educators and counselors through externships and pathway mapping. Incorporating this possible solution meets many of the qualities of a successful career pathway.

When teachers and counselors are well-informed and bought into the wide range of potential career paths available to students, they are more equipped to advise and guide students toward opportunities that would fit their strengths. So, while this possible solution does not directly address employer barriers or provide an applied learning opportunity, it does bring students awareness and exposure by proxy.

One educator shared her experience participating in an "externship through Willamette ESD, set up with building businesses in Medford like Knife River, showing us how to help our students go into a profession where they could be trained and paid livable wages at the same time. Also we learned what kinds of skills the industry was looking for, so I could turn around and share that with my students." This is a partnership among Willamette ESD, industry, and the Association of General Contractors, sponsored by Southern Oregon ESD.

This possible solution builds the connection between educators and industry, and leverages the educator-student relationship, causing their influence to develop career awareness for students, particularly if the careers demonstrated are in the trades. If the opportunity is free or paid for educators, includes a meal and transportation, and takes place during the summer or during a scheduled in-service day (as the current offering done), more educators are able to participate. If opportunities like these are required or incorporated into expected educator roles, then they would be more likely to reach all of the target populations.

5. INDUSTRY COLLECTIVE TRAINING FACILITY

The fifth possible solution is to develop a collective training facility, paid for by local industry, where future employees could gain knowledge and skills in their chosen field. Incorporating this possible solution meets some of the qualities of a successful career pathway.

A collective training facility would create the opportunity for students to participate in applied learning. It would address student barriers if transportation is paid for and coordinated, and if trainers mirror student participants. This would build experience and reduce stigma around the trades, if the facility were able to accomplish a strong employment placement rate upon completion of the training program. This would also build strong relations among industry employers and between potential employers and students.

It would also address employer barriers, because training would be conducted off-site, avoiding liability concerns, and employers would have a wide selection of well-prepared talent to hire from. One interviewee described it as, "A place where a few companies paid into it, and employees were trained. If you put money in, you get trained people back out. Our industry sites can't afford to do it on their own. Maybe they ask for $10,000 from 6-7 companies, use KCC as the homebase, then use 3D printers at Jeld Wen, or laser cutting at Highway 66."

This leverages the energy and interest of industry partners who are well aware of the current and upcoming hiring challenges they will face. One employer said,

> Companies that are growth minded know that we are dependent on those who are in school now. We're willing to do that work. It's a good investment and a passion project. Be able to illustrate the importance of it. Reminding people that our business depends on the youth. We're all going to get old. A growth minded business will look at the fact that our qualified people will get old and retire. We need to do the work to groom people to take those roles. It's a time investment, but it's so important.

However, this solution does not provide early exposure to careers, rather builds experience for students who have selected a career already. It also does not integrate into the education system or address educator barriers, rather adds another layer to the pathway that transforms students into employees. In other words, this would have to be a chosen path for students, so it may not reach the target populations identified.

One example of this is the Oregon Manufacturing and Innovation Center (OMIC). Located in Scapoose, OMIC's Portland Community College Training Center has plans to open in Spring 2021, and is focused on advanced manufacturing and offering programs based on an apprenticeship model. OMIC's mission is to "develop and apply advanced metals manufacturing technologies and processes for industrial competitive advantage and academic growth, while inspiring and educating the next generation's manufacturing workforce."[30] Members include industry partners and educational institutions, all paying into a future workforce.

6. STRONGER COORDINATED CONNECTIONS AMONG HIGH SCHOOL, POSTSECONDARY, APPRENTICESHIPS, TRAINING PROGRAMS, AND EMPLOYERS

The final possible solution brought forth was a stronger coordinated effort and connection among high school, postsecondary, apprenticeships, training programs, and employers. Interviewees expressed the need for an external entity that would take on the role of connector, communicator, and convener. With strong collaboration among these entities, leading to action, students are bound to receive better and more pervasive career exposure.

This solution does not directly address student barriers, employer barriers, or provide a direct applied learning experience. However, it focuses on building a systemic and integrated approach to high-wage, high-demand career pathways.

This solution leverages local relationships and expands upon them, assuming that if adults in the region are aligned, better solutions for students will come next. One interviewee said, "The beauty of Klamath Falls is that we are so small, so we have healthy relationships. We already partner on a number of initiatives. We lean on each other if there are struggles in the community. "

Some interviewees shared that this already exists, to some extent, in the region. One interviewee said, "We have it. In the Rogue Valley, it is the Business Education Partnership. Everybody's at the table - community, post-secondary, etc. We're all

[30] OMIC Mission. https://www.omic.us/explore/mission

there. It's just about getting back to the table, having open communication, it's eating the elephant one bite at a time." Another interviewee named the Rogue Valley Advanced Manufacturing Partnership. Others named the Southern Oregon STEM Hub. No matter who takes the lead, the solution is clear: a third party that is not an educator or an industry employer needs to own connections, communication, and convening for the region.

One interviewee said, "We need a catalyst to make it happen. I believe in the importance of this, but I'm super busy. You need people like me to talk to other businesses. These are our kids and your neighbor's kids." Another focused on ensuring there is a clear role for each player, "I think we develop a proposal that shows them where they fit in, where it's kind of a plug and play. Here's how we need your support and how you can be a part of this. A lot of people are distracted by their own job, so let's make it easy for them to contribute. Tell the story in a way that gets their buy-in."

A third interviewee pushed for a bias toward action rather than analysis:

> We have to learn by doing. We can't keep talking about things forever. It's never going to be the perfect time to start. We just need to start. People fall off and lose hope because there's so much time in discussion and planning, but eventually we need to get out of the gate. With all due respect to the many years of meetings that all of these people have been in. When I hear that we talked about the same thing 5 years ago, I want to make it happen or stop talking about it. That may be an impatient answer, but I'm just being honest.

One possible result of this stronger coordination might be an alignment of high school CTE programs with career opportunities in the region. That could look like increasing the number of high school construction programs to meet carpentry and trades needs. It could also align high school healthcare programs with the existing strong postsecondary offerings in that industry in the region.

While this solution may appear obvious, it will only address access for the target populations if that is a named goal with explicit strategies for each group, and accountability measures, rather than an unintended outcome of strategies that address all students.

7. ADDITIONAL IDEAS

Additional ideas were proposed that address a few qualities of successful pathways. They are listed below:

A. **A collaborative construction project:** This effort would pull students from a variety of grade levels to implement a construction project together. A collaboration among in-school and out-of-school educators could address some of the educator barriers, empowering teachers and students who are in the most rural parts of the region. This would also demonstrate hope and teamwork in a region suffering from compounded crises like low housing supply and fire damage.
B. **Develop better marking efforts**: To combat stigma against the trades, organizations could work together to develop social media content, flyers, and other information to share with students directly that would spark their interest, particularly in construction trades. It was suggested to leverage older student experiences in order to encourage younger students to participate. This would build awareness and address some student and employer barriers as well.
C. **Address apprenticeship barriers**: By working with the state's regulating body to reduce the requirements for apprenticeships and potentially developing additional local apprenticeship opportunities, this could fill a gap in pathways toward electrician and plumber careers.

D. **Build out support for CTE students**: Addressing inclusion concerns for students in CTE programs could lead to higher completion rates for students of color, girls, and low-income students. This holistic approach could work toward alleviating some of the student barriers identified through the data.

VISIONING

When asked to envision a future in which career pathways are accessible and successfully lead to high-wage, high-demand careers for students from the target populations, interviewees' eyes lit up, smiled, and shared their visions. These primarily fit into four main categories:

1. Individual purpose,
2. Value of educational and career pathways,
3. A brighter economic outlook and more livable region, and
4. Increased diversity and open-mindedness.

One of the common responses was a future in which individuals have a strong sense of self-worth and purpose. One interviewee said, "Less people sitting at home doing nothing, and the self-worth that they're getting, that's a huge game changer. You can't put a price tag on it." Another said, "People that feel that they're living a purpose-driven life, knowing they can go anywhere, that they're making more than enough money to live a healthy-balanced life. People are happy when they build the health of the community together." A third added, "Having opportunities to do more than just get by, to be able to be self-fulfilled and still live in a nice place would be awesome. To have a job with meaning where you contributed and are challenged."

Another vision was a strong value placed on clear and effective pathways for students. One interviewee said, "I would hope that there would be more value placed on education, more value placed on community and collaboration." Additionally, "People would see the value of schooling, which would then create a more positive outcome for the next generation." Another added "We would have a public school to private industry pipeline, with kids who see themselves in a super coordinated and detailed effort, that our school staff can communicate to their kids and families. So it's really clear in our mind, what this pathway is that goes out into industry." A third said, "I'd like to see these industries almost always be connected in some way to a student. And that's the status quo."

A third vision was a brighter economic outlook, retaining young people, and making the region more attractive. One interviewee said, "Overall, we would increase the productivity of our communities. How else would we rebuild without people and talent? Our region would be more vibrant. Our families would be more financially vibrant. Our pool of potential mentors for the future would be increased because they can teach. The overall health and wellness of the community would be better." Another interviewee said, "It would be thriving, I think. It would just be incredible. Right now there are pockets of poverty. I could see that if we could get our lower income, high-needs students into these career paths, that would affect other social determinants of health: their family relationships, housing. It would have a ripple effect on our community, and the future generations as well." A third said, "It would be booming with local young recent grads, starting businesses, working in the medical field, coming back to serve their community."

The fourth vision was increased diversity and open-mindedness. One interviewee clearly stated, "I'm hopeful that people will see the value in diverse conversations and how we rebuild better in such a way that similar profiles of people are there: seniors, disabled, new immigrants, low-income. That's important to our community." Another shared that simply increasing wages for youth from these target populations would diversify the area. They said, "If we are successful in providing high wage high demand careers for these youth, they will stay in this area, form families, build roots here. They will start to change the demographics and the way of the community. In effect, because they stay here, they would attract other people who may look like them, share the same values as them, and in essence showcase what our region can be."

Beyond stark diversification of the region, more of the population reaching a higher income level would lead to more open-mindedness. One interviewee said, “They’d be able to see the world and travel, where they can’t travel now. A lot of them don’t have those opportunities. They’re closed in. They live in a wonderful area, but with that change, they’d see that there’s a lot more. They’d be able to enjoy people of different cultures. They’d be able to experience different cultures and see that it’s not all about them. This world doesn’t revolve around this tiny community. Some of them would relish in that experience. They don’t have that right now.”

With more successful career pathways that engage girls, low-income students, rural students, and students of color, Southern Oregon community members envision their region full of people with purpose, who value education, who stay to contribute to the economic and social fabric of their community, and who develop an open-mindedness that expands beyond increased diversity.

APPENDIX 1: LIST OF POTENTIAL PARTNERS

This list represents those who participated in this needs assessment in some capacity and expressed interest in following through on making a solution come to fruition in collaboration with the Southern Oregon STEM Hub. This does not represent any specific commitment, rather a general expression of enthusiasm for next steps. This list is not exhaustive.

Education

1. Jessica West, Health Sciences, Grants Pass High School
2. Debbie Knapp, Prospect Charter School
3. Heather Armstrong, Talent Middle School
4. Shauna Bland, Grants Pass High School
5. Justin Eagar, Construction CTE at South Medford High School
6. Jake Leair, Manufacturing CTE, Grants Pass High School
7. Rob Dunham, Manufacturing CTE, Chiloquin High School
8. Phil Ortega, Eagle Point School District
9. Brent Barry, Phoenix/Talent School District
10. Ben DeCarlow, Butte Falls School District
11. Rob Evory, Klamath Community College
12. Hector Flores, Rogue Community College
13. Marco Vasquez, Rogue Community College
14. Ann Trausch, Electronics, Rogue Community Collage
15. Lisa Parks, Allied Health at Rogue Community College
16. Carl Thomas, Oregon Tech

Employers

1. Heather Crowder, Klamath Basin Homebuilders Association
2. Christina Kruger, Pacific Power
3. Russ Batzer, JB Steel Inc.
4. Melodi McGee, Bogatay Construction
5. Norman Kester, Quantum Innovations
6. Richard Booth, Siskiyou Community Health Center
7. Brent Kell, Valley Immediate Care

Community

1. Allison French, Talent Maker City
2. Colleen Padilla, SOREDI
3. Jill TeVelde, Rogue Workforce Partnership
4. Gene Merrill, Youth Pathways Partnership
5. Chery Stritenberg, Eagle Point School District, Shady Cove PTO/A

APPENDIX 2: INTERVIEW PROTOCOL

1. What is your connection to and experience with high-wage, high-demand careers in the Southern Oregon Region? For the STEM Hub's purposes, that is Jackson, Josephine, and Klamath County. What does your region cover?

2. Where are you seeing growth industries in your region? Where are there gaps or reductions? (Think by sector, geographic area, experience level, education level, etc.) → What would need to happen for these kinds of careers to be more available and accessible to young people?

3. In your experience, where are you seeing successful employee preparation for those high-wage, high-demand careers in your region? What are the factors that lead to those results? What are the gaps? → How might various partners (and who?) come together to grow and change in order to prepare the next generation of employees for high-wage, high-demand careers?

4. What opportunities and pathways do students take to end up in high-wage, high-demand careers? Who are those students? In what ways do they fit the criteria of the target populations: rural, low-income, students of color, and girls? Who is being missed? → What is happening in the community for these students to be missed?

5. What barriers do students in these target populations face along the way toward obtaining high-wage, high-demand careers in your region? Which barriers have you and your community have already addressed? What barriers seem most daunting and intractable? → In what ways do students need to be developed to navigate the pathways and overcome barriers? In what ways do we need to help students?

6. What do you know about opportunities and pathways that have been successful elsewhere? How might those work in this region, with these target populations? → What would need to change in the mindset and outlook of people here to be able to realize those exemplars?

7. What are qualities of your region that make it particularly attractive for students in these target populations to obtain high-wage, high-demand careers? What have you done to attract students in these target populations to those careers? What have you wanted to do or aspired to do but haven't yet been able to do? → How would it fundamentally change the region if we were to be more successful in attracting students?

8. What are you most hopeful about regarding employability and economic growth in your region? What worries you most? → What needs to be done to forge the commitment of employers, education partners, and community partners to grow the economic future viability of young people?

9. If all goes as well as it possibly could with regard to employing students from these target populations in high-wage, high-demand careers, what would that look like in your region in 5 years, in 10 years? How can the Southern Oregon STEM Hub support the community in accomplishing that dream?

APPENDIX 3: PURPOSEFUL STRATIFICATION

DIA conducted interviews with 34 people. These were intentionally sampled from the following categories, conducting at least the number of interviews below in each category:

- Sector
  - Education: 6
  - Community Partners: 6
  - Industry: 15
  - Students: 6
- Within Industry:
  - High tech: 3
  - Healthcare and Social Assistance: 4
  - Construction: 4
  - Manufacturing: 3
- County:
  - Josephine: 8
  - Jackson: 11
  - Klamath: 8
- Race:
  - White: 16
  - People of Color: 4

APPENDIX 4: EMPLOYABILITY SKILLS RUBRIC

ROGUE VALLEY EMPLOYABILITY SKILLS RUBRIC

	Beginning (1)	Developing (2)	Progressing (3)	Advanced (4)
Reliability	Regularly misses class and/or deadlines. He/she cannot be relied upon to follow through on commitments.	He/she is inconsistently reliable. Attendance can be sporadic. At times, he/she shows potential and initiative.	Attendance and follow-through is consistent. He/she is self-motivated and can be relied upon regularly.	Contributes substantially to learning process both by "showing up" and by encouraging and challenging others to fully participate.
Collaboration	Rarely exhibits a cooperative, interested attitude towards teamwork.	Is a cooperative team member but requires motivation to collaborate and function at a higher level.	Actively participates well in a team environment. He/she shows initiative and develops win-win solutions.	Functions at a very high level as a team player. Is very skilled as team leader in collaboration and handling team conflict/ disagreement.
Communication	Does not listen and or is not able to summarize key elements of verbal and nonverbal communication. Does not clearly express thoughts verbally and nonverbally.	Offers "safe" answers to simple questions and occasionally volunteers a response. Student is beginning to develop organized and appropriate verbal and nonverbal responses.	Communicates effectively (both verbally and nonverbally). Actively listens to others without interruption. Student contributes to class discussion by offering thoughts, opinions and asking appropriate questions.	Skilled at creating an open environment that encourages the flow of information. Verbal and nonverbal communication conveys both substance and intent with high accuracy.
Respect	Does not respect other's rights, ideas, opinions, and diversity of others.	Developing respect of other's rights, ideas, opinions and diversity of others.	Demonstrates respect of other's rights, ideas, opinions and diversity of others.	Respects the rights, ideas, opinions and diversity of others. Encourages others to express viewpoint without judgement.

ROGUE VALLEY EMPLOYABILITY SKILLS RUBRIC

	Beginning (1)	Developing (2)	Progressing (3)	Advanced (4)
Professionalism	Student does not take personal responsibility for appearance, behavior, actions, or verbal communication.	Shows inconsistent ability to manage their behavior or actions, appearance, or verbal communication.	Student takes personal responsibility for their appearance, verbal communication, behavior or actions.	Accepts full responsibility for own appearance, behavior and actions. Student is a leader and role model in helping classmates monitor and progress in their behavior, communication, and behavior skills.
Attitude	Regularly displays a negative attitude. Is often perceived as pessimistic, self-centered and/or discouraging.	Attitude fluctuates between positive/ encouraging to negative/pessimistic.	Makes a positive impression to those around them. Creates and sustains an attitude that encourages others to do their best.	Demonstrates a positive and encouraging attitude even in the face of adversity. Leads as a role model and shows empathy and compassion towards others.
Problem Solving	Does not attempt to identify, describe, or solve the problem	Student primarily depends on others to solve problems and identify possible solutions.	Finds multiple ways to solve a problem and share the strengths and weaknesses of a solution with a variety of audiences.	Student is a leader that can plan and organize work; reason and make objective judgments; and keep their mind on several parts of their job.