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Stimulating Apprenticeship in Oregon Now and For the Future

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Abstract

This paper recommends several feasible steps to widen opportunities for Oregon workers to achieve rewarding careers. Today's high unemployment is a call to action to expand employment, especially for those formerly in hart-hit sectors, such as leisure, hospitality, and restaurant industries. As the pandemic eases, Oregon will create additional jobs, but skill mismatches remain likely. The paper highlights initiatives that can improve job outcomes in the short-run, including increasing the academic skills of the unemployed and creating virtual apprenticeships. However, the focus is on upgrading skills more broadly. The paper proposes changing the fundamental approaches to learning for careers by substantially increasing the roles of apprenticeship and other forms of work-based learning in real jobs and careers. It describes a set of feasible steps Oregon can take to achieve significant improvements in marketable skills and career opportunities.

1. Introduction

The covid-19 pandemic's impacts on health and mortality and on the US economy have led to serious hardships. The shutdown of many areas of economic activity led to a loss of 22 million jobs in March 2020 and April 2020. The May through August 2020 recovery generated 10.6 million jobs had returned, but 10.3 million people had yet to return to work and over 2 million reentrants to the workforce remained unemployed. While the economy is slowly recovering, unemployment is likely to remain high relative to the full employment the US was experiencing just a few months ago. Moreover, the continuing danger of the pandemic has forced changes in the nature of work toward remote work and physical distancing in factories and stores. Job losses have hit some sectors especially hard; leisure and hospitality normally account for 11% of jobs but experienced over one-third of declines in employment.[1]

These sudden developments and uncertainty about economic recovery pose difficult short-run and long-run dilemmas for managers and policymakers in the workforce system. One response to the losses of jobs and incomes has been to shield most unemployed from income losses as a result of dramatic increases in unemployment insurance (UI) claims. Nationally, the number of workers receiving benefits under UI jumped from 1.7 million in mid-March to nearly 23 million in early May and stood at about 13 million in mid-September.[2] Strikingly, because of the $1.7 trillion rise in UI and other transfers, personal income increased sharply during the sudden downturn by over $1 trillion per month. Despite the cumulative $3.3 trillion increase in personal income between February 2020 and June 2020, personal spending actually declined by $6.7 trillion, thus implying a cumulative increase in savings of over $10 trillion.[3]

The extraordinary jump in government spending is unsustainable. Yet, while many workers will have returned to their jobs, unemployment is likely to remain high for the coming year. Temporary layoffs accounted for nearly all the increase in unemployment between March and August, with 6.2 million still temporarily idled and over 3 million on permanent layoffs. Many of these 9 million workers will need to find other jobs.

While these short-run concerns are real and call for wise policies, ideally efforts to deal with the short- and intermediate term concerns should support long-term solutions to economic and workforce problems. This policy brief focuses on structural issues in Oregon's workforce policies but address short-term concerns as well. It begins with a look at the economic environment in Oregon before the Covid-19 pandemic, then discusses why a policy shift to

[1] These data come from Bureau of Labor statistics based on surveys of employers and of workers. See https://www.bls.gov/web/empsit/ceseesummary.htm and https://www.bls.gov/web/empsit/cpseea32.htm.
[2] https://oui.doleta.gov/press/2020/092420.pdf and https://oui.doleta.gov/press/2020/051420.pdf.
[3] Tabulations from https://www.bea.gov/sites/default/files/2020-08/pi0720.pdf

expand apprenticeships can strengthen the economy while widening opportunity, then turns to concrete steps for expanding apprenticeship and finally draws some conclusions.

2. Oregon's Economic Environment, Jobs, and Education

Job losses from the pandemic mirror those in the rest of the US, despite Oregon's relative success in having one of the lowest fatality rates among all states. The latest data from the Bureau of Labor Statistics (BLS) reveal that the number of unemployed more than quadrupled from about 70,000 in February to 314,000 in April before falling back to 158,000 in August. Although unemployment will no doubt decline further over the next few months, tens of thousands of Oregon workers are likely to remain unemployed until the pandemic recedes to very low levels. Employment in Oregon fell suddenly in April by 243,000 from over 2 million to almost 1.8 million. As of August 2020, employment remained 140,000 below the March 2020 levels.[4]

Prior to the pandemic (as of the four quarter of 2019), the patterns of jobs in Oregon resembled those in the rest of the country. About three of every five jobs were in six industries: health care, retail trade, manufacturing, construction, education, and accommodation-food services (see Table 1). Nearly one in four men worked in manufacturing and construction. Health and education industries employed about one-third of women workers. The growth in jobs between the fourth quarters of 2015 and 2019 ranges widely, though the largest two are health care and construction at 17% and 15% of all gains in employment.

The pattern of new hires differs from employment levels and gains in employment (see Table 2). Of all new hires, accommodation and food services, retail trade and administrative support and waste services are the largest, with about 15%, 11%, and 11% respectively. New hires in health care averaged about 10 percent of all new hires. Another way of looking at the data for placement opportunities is to examine new hires as a share of employment by industry. Such data incorporate turnover as well as employment growth. While agriculture, restaurants, art and recreation show high levels of new hires relative to employment, new hires are about 20% of jobs in construction, transportation and retail trade.

The 2019 earnings patterns by industry show expected variations as well as nearly 14% growth in money terms (see Table 3). A few indicators stand out, including substantial 17%+ earnings growth in utilities, construction, and information industries. In addition, the combined average monthly earnings for utilities, construction, manufacturing, and wholesale trade is nearly 90% of the level in the information industry.

[4] See https://data.bls.gov/timeseries/LASST410000000000003.

Earnings by occupations vary widely as well. But, a separate analysis finds that most of the variation is within-occupations rather than between occupations. To the extent that earnings reflect productivity, the finding suggests considerable room for increasing worker earnings by raising their productivity within their current occupation.

Oregon's educational distribution is like the distribution in the rest of the country (see Table 4). Of individuals between the ages of 25 and 54, about one-half of 25-54-year-olds have only a high school diploma, some college, or an Associates' degree. Over one-third have completed a BA or higher degree and about one in seven lack even a high school diploma. Educational attainment is higher among women than men. About one in six men but only one in eight women lack a high school diploma.

Data on employability and occupational skills are generally lacking for Oregon and the US, yet workers with those capabilities and experience are likely to achieve higher earnings than the average for their educational group. One important way to gain employability and occupational skills is through apprenticeship. Evidence from Washington State and from a separate study indicates that learning skills through apprenticeship training can lead to substantially higher earnings for workers. Moreover, such workers are particularly valuable to employers and therefore less likely to face layoffs and more likely to be called back to work, if they are laid off.

3. The Case for Apprenticeship

Apprenticeship training is a highly developed system for raising the skills and productivity of workers in a wide range of occupations, with demonstrated success abroad and scattered examples of success domestically. Apprentices are employees who have formal agreements with employers to carry out a recognized program of work-based and classroom learning as well as a wage schedule that includes increases over the apprenticeship period. Apprenticeship prepares workers to master occupational skills and achieve career success. Under apprenticeship programs, individuals undertake productive work for their employer; earn a salary; receive training primarily through supervised, work-based learning; take academic instruction that is related to the apprenticeship occupation; and receive a certificate of completion.

Apprenticeships within the United States and elsewhere show how construction occupations can reach high wages and high productivity. The question is whether the model can be extended and attract firms to upgrade other occupations. Apprenticeship expansion holds the possibility of substantially improving skills and careers of a broad segment of the US workforce. Completing apprenticeship training yields a recognized and valued credential attesting to mastery of skill required in the relevant occupation. Apprenticeships are distinctive in enhancing both the worker supply side and the employer demand side of the labor market. On

the supply side, the financial gains to apprenticeships are strikingly high. Studies in the United States indicate that apprentices do not have to sacrifice earnings during their education and training and that their long-term earnings benefits exceed the gains they would have accumulated after graduating from community college (Hollenbeck 2008). The latest reports from the state of Washington show that the gains in earnings from various education and training programs far surpassed the gains to all other alternatives (Washington State Workforce Training and Education Coordinating Board 2014). These results are consistent another US study as well as with many studies of apprenticeship training in Europe, showing high rates of return to workers.

On the demand side, employers can feel comfortable upgrading their jobs, knowing that their apprenticeship programs will ensure an adequate supply of well-trained workers. Firms reap several advantages from their apprenticeship investments (Lerman 2017). They save significant sums in recruitment and training costs and reduced errors in placing employees, avoiding excessive costs when the demand for skilled workers cannot be quickly filled and knowing that all employees are well versed with company procedures. Because employers achieve positive returns to their investments in apprenticeship, the worker and the government can save significantly relative to conventional education and training (Muhlemann and Wolter 2014). A recent detailed study conducted by the US Department of Commerce and Case Western University (Helper et al. 2016) found 40% to 50% returns to two expensive apprenticeship programs.

Noneconomic outcomes are difficult to quantify, but evidence from Europe suggests that vocational education and training in general is linked to higher confidence and self-esteem, improved health, higher citizen participation, and higher job satisfaction (Cedefop 2011). These relationships hold even after controlling for income. An Australian study found that quality apprenticeships improve mental health (Buchanan, et al. 2016).

These earnings and noneconomic benefits come with far less government funding than other education and training approaches. The Washington State results find even from a narrow financial point of view—public spending in comparison to added taxes from the participants' long-term gains in earnings—the government return on apprenticeship spending is $36 to $1,

Apprenticeships, Inequality, and Mobility

Can apprenticeship improve on other efforts to reduce inequality and increase mobility? Expanding college is a common strategy, given the substantially higher earnings of BAs than of those with less education. However, large increases in US funding to expand college graduation rates led to increases in college degrees but no reduction in earnings differentials. Moreover, gains in college completion are weak among low-income and minority students. For example, at

a point six years after black students entered a two-year college, only about one in six had earned an associate's or bachelor's degree. The rates for low-income and Hispanic students were only slightly higher, at about 21 percent.

High college-dropout and low-completion rates, especially for males, are major drawbacks of the college expansion strategy. Community colleges have played a central role for policymakers in raising earnings opportunities for low- and middle-income students. Yet the results have proved wanting, given their high costs, low graduation rates, and frequent mismatches between what is taught and what employers require.

Expanding apprenticeship has far more potential to increase economic mobility. They provide much needed work experience and develop employability skills. Apprenticeship can stimulate increased engagement, learning, and the development and retention of skills valued in the job market. As researcher Robert Halpern (2009) discovered, "Apprenticeship provides experience that young people can acquire in no other way," as they work in disciplines that are interesting and new. The benefits extend to the development of young people. Youth apprenticeship helps young people develop independence and self-confidence through their ability to perform difficult tasks. By mastering tasks that other young people cannot, apprentices gain a strong sense of pride that a B– student is unlikely to feel when passing a test or even completing a paper. While apprentices are expected to demonstrate professionalism and care, they are not expected to be perfect. Youth try out new identities in an occupational arena and experience learning in a context of production, of making things.

Apprenticeships involve constructive adults in ways that make sense to young people. Adult mentors experienced in a field offer guidance but allow youth to make their own mistakes. Supervisors' monitoring helps apprentices focus on performing well at work and in the classroom. Unlike community colleges or high schools, where one counselor must guide hundreds of students, each mentor deals with only a few apprentices. Unlike typical part-time jobs, high school and college students in apprenticeships integrate what they learn on the job with what they learn in the classroom.

Because apprenticeships require far less of a financial investment than college for the worker, they are less risky, more likely to attract low-income students, and more likely to lead to valued occupational credentials. By offering a work-based instead of a classroom-based approach, apprenticeships are typically effective at training many workers who are unable to complete their studies at college and who might otherwise end up in low-wage jobs. Still another way apprenticeship can lower inequality is by influencing the distribution of jobs and job tasks. Researchers have found examples of firms producing the same good or service using technologies that generate more or fewer skilled jobs paying good wages.

Apprenticeships in Oregon

Like the rest of the US, apprenticeship currently plays only a minor role in helping Oregon workers enter rewarding careers. The Oregon Department of Labor reports 10,385 individuals undergoing apprenticeships today. Although this figure amounts to only 0.5% of the workforce, it represents nearly a doubling of apprenticeships from the 2014 level of 5,200 and a rate that is higher than most states.[5] At the same time, countries with robust apprenticeship systems engage about 2.5-3% of their work forces in apprentices, or about five to six times the Oregon level. Still, assuming apprenticeships last two to three years (2.5 years), the current level amounts to about 8% of a typical single year cohort. Moreover, apprentices in Oregon appear to penetrate the construction trades at a high level.

One reason for the low numbers in Oregon and other states is the minimal number of apprenticeships outside building trade and some manufacturing occupations. Recent activities have added IT support professional, network security administrator, and medical assistant occupations. But, the potential range of apprenticeship occupations is far wider than the Oregon's list of Apprenticeship Trades. (Using the term "Trades" indicates an emphasis on construction and selected manufacturing fields compared to the broader term, occupations).

Increasing the scale of apprenticeships in modern economies is certainly feasible. In recent years, England scaled their program from 150,000 to over 850,000 slots and today have well-developed occupational standards for over 500 apprenticeship occupations, ranging from accounting technician to insurance professional to landscape supervisor.[6] In the US, South Carolina scaled their program from about 3,000 to over 20,000 apprentices, almost double the Oregon rate per capita.[7] At the same time, South Carolina's apprentices are far more diverse than the US average, with black apprentices making up nearly 40 percent and women over 33 percent of all new apprentices (Kuehn 2017).

Because applicants already far exceed the number of apprenticeship slots, the key barrier to expansion is increasing apprenticeship openings offered by employers offer. Counseling young people about potential apprenticeships is a sensible complementary strategy to working with companies. But encouraging interest in apprenticeship could be counterproductive without a major increase in apprenticeship slots.

[5] See https://www.dol.gov/agencies/eta/apprenticeship/about/statistics.
[6] https://www.instituteforapprenticeships.org/apprenticeship-standards/?
[7] https://www.dol.gov/agencies/eta/apprenticeship/about/statistics

4. **Approach to Apprenticeship Expansion**

Stimulating employers to adopt apprenticeship as a primary talent development approach is the best way, perhaps the only way, to expand apprenticeship. But how best can Oregon do so?

I recommend six steps to scale Oregon apprenticeship.

Occupational Frameworks

Like 25 other state agencies, Oregon's Bureau of Labor and Industries registers and supports apprenticeship programs. One part of this task is to examine applications for new apprenticeship sponsors to determine the adequacy of their skill frameworks and their ability to comply with other requirements, including Equal Opportunity provisions. In many states the regulatory process requires a consideration of occupational standards (called work process schedules) on an individualized basis and can slow the process by which employers start programs and hire apprentices. The current US "registered apprenticeship" system is having individual companies or other sponsors (such as unions) that wish to register their programs to supply their own skill frameworks and curriculum.

In contrast, nearly all countries with robust apprenticeship systems create occupational frameworks for apprenticeship that all employers training in the relevant occupation mainly follow, with modest additions relating to their own organization. Countries vary in their approaches, but all rely on the cooperation of the public and private sectors. The Institute for Apprenticeship in England recently began operating, with the responsibility to oversee skill frameworks initially created by leading employers using the occupation.

Oregon could incorporate sets of skill frameworks that would serve as a kind of "safe harbor" standards, such that any employer adopting such frameworks would have a fast track for approval. Such standards could be widely publicized for employers, potential apprentices, and workforce organizations. Under a contract from the US Department of Labor, the Urban Institute has been publishing competency-based occupational frameworks for apprenticeships in several occupations. State and local workforce agencies can benefit from information on apprenticeable occupations displayed in convenient form at the enhanced website operated by the US Office of Apprenticeship (www.apprenticeship.gov).

Establish an Oregon Apprenticeship Brand

One approach used by South Carolina and now beginning in Kentucky is branding the state's apprenticeship program. When South Carolina began its expansion efforts, officials decided to create a brand—Apprenticeship Carolina— that gave apprenticeship a local flavor. Oregon could do so as well.

Selling and Organizing Apprenticeships

Branding and transparent occupational frameworks will not suffice without a well-developed system for selling and organizing apprenticeships. An employer convinced by an advertisement must have a place to call to learn about and implement an apprenticeship in the organization.

The success of South Carolina in selling and organizing apprenticeships depended using individuals who understand business, who are engaging, who had worked in companies, ideally the business services industry, and who knew how to develop and manage relationships. The expansion of apprenticeship should involve reaching broad industry sectors, including advanced manufacturing, health care, and information technology. It can draw on business services staff from Workforce Innovation and Opportunity Act (WIOA) agencies to cooperate and gain the skills required to work with businesses to diagnose their skill demands, including what they see as an ideal set of skills they want workers to master, and how apprenticeship can play a role in achieving results.

Promoting Group Sponsorship

Encouraging industry associations, community colleges, high schools, staffing firms and other organizations to become group apprenticeship sponsors can help scale apprenticeship by making it easy for employers to adopt apprenticeships. The paperwork and other administrative burdens on employers can be reduced substantially. Employers need only sign an employer acceptance agreement that commits them to following the guidelines and training procedures specified in the registration document and the associated work process schedules. In Iowa, over 17 high schools are registered apprenticeship sponsors (Marotta, Boren and San Miguel 2020), as are some high schools in Tennessee. An insurance association in Kentucky as well as at least one Kentucky community college both serve as apprenticeship sponsors. Selected industry associations have become sponsors, such as the Wireless Infrastructure Association.

Support for Off-Job Learning

One can make a strong case for the training firm not having to fund the off-job learning in an apprenticeship. The skills learned in the off-job courses are general that the worker's added productivity can be applied not only to the current employer but to many other employers. For this reason, the employer cannot recoup the provision of this general training. The worker gains the benefit, but the government shares the worker's gain in the form of higher taxes and reduced transfers. On the practical side, the government already funds a significant share of the costs of courses aimed at teaching occupational skills but does so in a way that is far less cost efficient than apprenticeship.

Oregon colleges could reap savings from this approach, since every apprenticeship slot stimulated by an already funded college or training organization increases the work-based component of training borne by the employer and reduces the classroom-based component often borne by government. Fourteen states, including Washington State, already provide some sort of tuition assistance.

Another possibility is to expand youth apprenticeship substantially and use existing high school–based career and technical education (CTE) programs to finance off-job learning. Since high school CTE course are already financed as an entitlement, the funds to complement work-based learning in apprenticeships would be readily available. Career academies and CTE schools already include classroom-related instruction and sometimes work with employers to develop internships.

Allowing the use of WIOA, Perkins Act dollars, college scholarship funding and direct state funding of colleges to pay for at least the classroom portion of a registered apprenticeship program makes perfect sense as well. The returns on investments in community colleges are far lower than the returns to apprenticeship.

Enhanced Mentoring and Train the Trainer Initiatives

Apprenticeships have a higher average completion rate than community colleges, but the rates hover around 45-50%. One way of raising these rates as well and quality of apprenticeships is to upgrade the ability of mentor/trainers. A trainer must be able to: foster a motivating learning environment, select training methods and materials appropriate to the target group and deploy them in specific situations, support apprentices with learning difficulties through customized training design and counseling, and to ensure apprentices gain competence in all the relevant tasks. In Germany, anyone who wishes to serve as a trainer in the apprenticeship system must demonstrate both technical qualifications and appropriate personal attributes.

The United States lacks any formal system for insuring trainers of apprentices have the requisite skills and personal attributes to perform well. Oregon could pioneer such an effort, especially with new apprenticeship programs.

Immediate Steps During Covid-19

Increased Preparation in Academic Skills

Many workers lack the basic math and reading skills necessary to increase productivity and earn good wages. The latest data document low and stagnant levels of literacy, numeracy, and digital problem-solving; 27 percent of employed workers were unable to solve a problem with

common decimals and fractions. In the service sector, where job losses are enormous, 74 percent of employees have low numeracy skills.

One approach to preparing workers for the post-Covid environment is to link efforts at learning with bonus unemployment insurance. Workers receiving unemployment assistance would qualify for incentive payments to increase their generic skills and for funding to help them access necessary e-learning tools, educational videos, and mentoring. The financial incentives to workers would be performance-based and aim to replace a higher share of lost earnings than the 50 percent level often provided by UI.

Oregon agencies administering UI would invite recipients to participate in a learning program (in math, reading, digital skills, or language) in return for a supplement to their weekly payments. State and local education agencies would receive federal funding to mount online programs to raise reading and math skills. These agencies could mount programs themselves or contract out the services. Oregon's state education department would oversee the curriculum to ensure it fits with the goals of the program.

Existing resources include many free online tools and videos from organizations such as Khan Academy, Alison, Mooc.org, Smartly, Mobi, Adobe Education Exchange, Udemy, and Grow with Google.

UI recipients receiving a 50 percent replacement rate could top up their payments to 80–85 percent of prior earnings. The relevant agency would pay the supplements monthly or biweekly so long as recipients demonstrate active participation and progress toward goals. Well-educated unemployed people would be invited to learn mentoring skills and subsequently receive payments to help workers increase their generic skills. Another on-line initiative would focus on increasing awareness of a variety of occupational options available now or in the near future.

Identify and Promote Virtual Apprenticeship Options

Oregon could partner with selected public and private employers to create virtual apprenticeships to advance skills. Creating public sector apprenticeships would be an especially valuable effort not only for the programs themselves but also in demonstrating to private employers the state's willingness to make the effort to start programs. UI recipients, others not working, and low-wage workers could have priority in applying for these apprenticeships. State grants could provide performance-based funding to intermediaries and employer sponsors that stimulate apprenticeships using online learning.

Virtual apprenticeships show promise for several occupations, including medical coding, medical transcription, pharmacy techs, cyber technicians, software development, and even

insurance sales brokers. Competency-based occupational frameworks to ease program design and judge how well participants attain necessary skills are already available for several of these fields. To provide opportunities to use online platforms for the off-job related instruction component of apprenticeships, the national Office of Apprenticeship is collecting a range of industry-specific online resources and collecting best practices in virtual apprenticeships. OA has been encouraging the use of online instruction during this period based on its recently released Bulletin 2020-51.

Currently, two providers of virtual learning linked to apprenticeship look promising. One is TRANSFRVR, (https://www.transfrvr.com/), a company that develops Virtual Reality (VR) modules for apprenticeships and other types of training. The company has experience with apprenticeship programs and is undertaking extensive work in Alabama for Lockheed Martin and Alabama community colleges. These two links illustrate some of their work with VR modules. Although I do not have in-depth information about these efforts, I understand the main costs for setting up a specific program are fixed costs (about $10,000 per program), but the cost per apprentice would decline rapidly with the number of apprentices. The programs include assessments of prospective apprentices. By beginning a pre-apprenticeship with such modules, potential apprentices can determine their interests and employers can access a pool of apprentice applicants with the initial experience and interest that make them more likely to succeed. Here are links to short videos illustrating the VR training modules. https://youtu.be/_dz9VLhtbTs and https://youtu.be/0stGgpBcclQ

Another example of a company providing virtual training for apprenticeship is Interplay Learning (www.interplaylearning.com). This company focuses on skill trades, using a sequence of video segments to help apprentices gain confidence in performing various tasks and shorten the time required for hands-on activities demonstrating competence. The costs per apprentices for tailoring the material to an apprentice program is quite low.

These and presumably other uses of VR and video are likely to improve the match between those interested in an apprenticeship and apprenticeship openings, to allow some of the training to take place remotely and thus more safely in today's environment, and to shorten the process by which apprentices gain competency in their occupations.

Examples of Target Occupations for Expanding Apprenticeship

Choosing specific occupations to target for apprenticeship is hazardous since it is difficult to predict employer demand. Still, as Joseph Fuller and Matthew Sigelman (2017) point out, many occupations for which apprenticeship training makes sense are going to require new skilled workers. IT jobs will continue to expand, especially in areas of cybersecurity and IT technician positions. Health care industries will continue to demand medical assistants, medical records

technicians, and hospital technicians. Mid-level managerial skills in specific fields will remain important. Workers laid off from leisure/hospital industries represent the larger group of job losers. Although one can point to fields with jobs that require similar skills, including customer service positions and health care, Oregon should be opportunistic in seeking jobs and careers in which employers are willing to invest. As noted above, Oregon's state and local governments can assist in this process by funding intermediaries to sell and organize apprenticeships and other work-based learning opportunities, ensure funding is available for off-job learning, and increase awareness among the unemployed and other job seekers about the range of opportunities becoming available.

Conclusions

Prior to the shutdowns required to respond to the Covid-19 pandemic, Oregon was experiencing full or near full employment, with unemployment rates of only 3.3-3.5%. As of August 2020, Oregon's unemployment rate stood at 7.7%, below California's 11.4% but still double the pre-Covid rate. As the economic recovery proceeds, many employers will be looking to rehire workers and to find new workers for their operations. The transitions, especially to new workers, affords Oregon with the opportunity to encourage employers to build skills through a public-private initiative to expand apprenticeship. At the same time, over 90 percent of jobs have continued, but the pandemic may have influenced employers to perform more tasks online and increase the online component of what workers do. In any event, since upgrading skills and earnings will remain key goals for Oregon, expanding apprenticeship can make a major contribution to policy.

This paper recommends several feasible steps that can help achieve these goals. In doing so, it would make sense for Oregon to goals for expanding apprenticeship over the next 1-5 years and for widening the scope of Oregon's apprenticeship efforts. Currently, the Oregon Department of Labor reports 10,385 individuals in registered apprenticeships or about 0.5% of employment. There are probably a number of unregistered apprenticeships of reasonable quality as well. Were Oregon to reach 2.5% of its workforce in apprenticeship, apprentices would number over 48,000. This is a solid long-term goal, given that such a share is common in countries with advanced economies and robust apprenticeship programs. A good interim goal could be to double the existing number of apprenticeships to about 20,000 or just over 1% of the workforce.

Alongside its expansion agenda and over the coming years, Oregon could undertake a set of initiatives to widen the capacity of the system to provide online learning for the related instruction in apprenticeships, to enhance the quality of mentoring, to increase completion rates, and ultimately, to build a system of third-party assessments of apprentices and apprenticeship programs.

Although these steps represent an ambitious agenda, evidence suggests they are quite feasible. With such an effort, Oregon employers will likely follow their counterparts in other countries, create a significant number of apprenticeship slots, and realize gains in recruitment, workforce quality, and improved productivity. Institutional change will take time but will increase the earnings of workers in middle-skill jobs, widen access to rewarding careers, enhance occupational identity, and expand the middle class.

Table 1: Employment by Industry in Oregon: 4th Quarter 2019

	4th Quarter 2019		Job Growth, 2015-2019	% of new jobs
	Number	Percent	Number	Percent
Agriculture, Forestry, Fishing and Hunting	54,493	2.8%	5,980	3.8%
Mining, Quarrying, and Oil and Gas Extraction	1,959	0.1%	167	0.1%
Utilities	7,734	0.4%	445	0.3%
Construction	117,439	6.1%	23,978	15.4%
Manufacturing	193,528	10.0%	7,847	5.1%
Wholesale Trade	75,827	3.9%	2,244	1.4%
Retail Trade	206,216	10.7%	4,359	2.8%
Transportation and Warehousing	71,498	3.7%	13,741	8.8%
Information	38,995	2.0%	3,046	2.0%
Finance and Insurance	57,655	3.0%	(163)	-0.1%
Real Estate and Rental and Leasing	30,552	1.6%	3,762	2.4%
Professional, Scientific, and Technical Services	101,552	5.2%	11,908	7.7%
Management of Companies and Enterprises	51,261	2.6%	5,022	3.2%
Administrative and Support and Waste Management and Remediation Services	107,058	5.5%	3,199	2.1%
Educational Services	161,031	8.3%	8,189	5.3%
Health Care and Social Assistance	280,654	14.5%	26,482	17.0%
Arts, Entertainment, and Recreation	32,415	1.7%	3,833	2.5%
Accommodation and Food Services	188,552	9.7%	15,459	10.0%
Other Services (except Public Administration)	82,280	4.3%	11,809	7.6%
Public Administration	74,924	3.9%	4,034	2.6%
Total	1,935,623	100.0%	155,341	100.0%

Table 2: Annual New Hires in 2019 in Oregon by Industry Sector

	Number	Percent of New Hires	New Hires as % of Jobs
Agriculture, Forestry, Fishing and Hunting	32,057	8.9%	58.8%
Mining, Quarrying, and Oil and Gas Extraction	225	0.1%	11.5%
Utilities	441	0.1%	5.7%
Construction	24,405	6.8%	20.8%
Manufacturing	21,371	6.0%	11.0%
Wholesale Trade	8,491	2.4%	11.2%
Retail Trade	40,093	11.2%	19.4%
Transportation and Warehousing	14,704	4.1%	20.6%
Information	6,387	1.8%	16.4%
Finance and Insurance	5,668	1.6%	9.8%
Real Estate and Rental and Leasing	4,689	1.3%	15.3%
Professional, Scientific, and Technical Services	13,758	3.8%	13.5%
Management of Companies and Enterprises	4,552	1.3%	8.9%
Administrative and Support and Waste Management and Remediation Services	40,516	11.3%	37.8%
Educational Services	18,780	5.2%	11.7%
Health Care and Social Assistance	37,526	10.5%	13.4%
Arts, Entertainment, and Recreation	10,068	2.8%	31.1%
Accommodation and Food Services	53,961	15.1%	28.6%
Other Services (except Public Administration)	14,642	4.1%	17.8%
Public Administration	5,845	1.6%	7.8%
Total	358,176	100.0%	18.5%

Source: Quarterly Workforce Indicators, U.S. Bureau of the Census.

Table 3: Average Monthly Earnings in 2019 in Oregon by Industry Sector

	2015: Q1-Q3 average	2019: Q1-Q3 average	% Change in nominal terms
Agriculture, Forestry, Fishing and Hunting	$2,893	$3,212	11.0%
Mining, Quarrying, and Oil and Gas Extraction	4,399	5,052	14.9%
Utilities	6,605	7,740	17.2%
Construction	4,378	5,165	18.0%
Manufacturing	5,339	5,892	10.4%
Wholesale Trade	5,371	6,171	14.9%
Retail Trade	2,570	2,921	13.6%
Transportation and Warehousing	3,655	4,153	13.6%
Information	5,676	7,019	23.7%
Finance and Insurance	6,246	7,178	14.9%
Real Estate and Rental and Leasing	3,304	4,126	24.9%
Professional, Scientific, and Technical Services	5,802	6,653	14.7%
Management of Companies and Enterprises	8,124	8,101	-0.3%
Administrative and Support and Waste Management and Remediation Services	2,916	3,428	17.6%
Educational Services	3,839	4,413	15.0%
Health Care and Social Assistance	4,056	4,540	11.9%
Arts, Entertainment, and Recreation	2,346	2,885	23.0%
Accommodation and Food Services	1,710	2,068	21.0%
Other Services (except Public Administration)	2,749	2,851	3.7%
Public Administration	4,659	5,380	15.5%
Total	$4,050	$4,600	13.6%

Source: Quarterly Workforce Indicators, U.S. Census Bureau.

Table 4: Educational Distribution in Oregon by Sex: 2018

Highest Grade/Degree Completed	Men	Women	Total
Grade 10 or less	7.0	6.1	6.6
Grade 11 or 12, No Diploma	4.5	2.6	3.6
Ged or alternative credential	5.1	3.9	4.5
Regular High School diploma	17.6	13.6	15.6
Some College No Degree	23.5	24.4	24.0
Associates' Degree	8.5	9.4	8.9
Bachelor's Degree	21.8	25.3	23.5
Master's Degree	7.9	11.1	9.5
Professional or Doctoral Degree	4.1	3.6	3.9
Percent in Summary Categories			
Lacking HS Diploma	16.6	12.6	14.6
HS Diploma, Some College, AA	49.6	47.4	48.5
BA or Higher	33.8	40.0	36.9

Source: Tabulations from the 2018 American Community Survey.

Table 5: Occupational Distribution and Median Earnings by Occupation: 2019

Occupation	Employment	% of Jobs	Median Earnings
Architecture and Engineering Occupations	43,180	2.27	78,310
Arts, Design, Entertainment, & Sports Occupations	31,330	1.64	49,120
Building and Grounds Cleaning and Maintenance	55,200	2.9	30,190
Business and Financial Operations Occupations	99,080	5.2	67,650
Community and Social Service Occupations	38,390	2.01	48,760
Computer and Mathematical Occupations	54,320	2.85	85,380
Construction and Extraction Occupations	87,280	4.58	52,660
Educational Instruction and Library Occupations	109,520	5.75	50,180
Farming, Fishing, and Forestry Occupations	13,510	0.71	30,420
Food Preparation and Serving Related Occupations	188,460	9.89	26,340
Healthcare Practitioners and Technical Occupations	100,720	5.28	86,360
Healthcare Support Occupations	76,340	4.01	32,640
Installation, Maintenance, and Repair Occupations	67,990	3.57	47,070
Legal Occupations	13,110	0.69	76,230
Life, Physical, and Social Science Occupations	21,310	1.12	64,900
Management Occupations	116,150	6.09	94,810
Office and Administrative Support Occupations	247,470	12.98	38,900
Personal Care and Service Occupations	49,910	2.62	29,850
Production Occupations	122,160	6.41	37,560
Protective Service Occupations	33,590	1.76	49,260
Sales and Related Occupations	177,040	9.29	31,490
Transportation and Material Moving Occupations	159,820	8.39	35,050
Total	1,905,880	100.01	38,900

Source: Tabulations from the Bureau of Labor Statistics Occupation and Earnings

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