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# Untapped Potential:

## How new apprenticeship approaches will increase access to economic opportunity



By Matt Sigelman, President, Burning Glass Institute, Euan Blair, CEO, Multiverse

# Untapped Potential: How new apprenticeship approaches will increase access to economic opportunity

## Why apprenticeships? A solution for employers, workers, and society.

Economic shifts in the wake of the pandemic have left many US industries scrambling for talent. Despite the possibility of a recession, there are still about 50% more jobs than job seekers, and many experts predict that even in a sluggish economy, the labor market will remain tight. At the same time, three quarters of US workers have jobs that offer neither the prospect of better pay nor concrete opportunities for advancement. For employers struggling to find the talent they need and for workers whose careers are stalled, apprenticeships offer a powerful solution.

Apprenticeship isn't just a critical new avenue for broadening the talent base. It's also an important tool for diversifying talent pipelines. Individuals from low-income backgrounds and communities of color – who tend to be underrepresented among college graduates – are often overrepresented in lower-wage fields with few viable career pathways to quality jobs and careers. By pulling employees up from within, employers can both close their skills gaps, and leave behind the zero-sum game of wrestling one another for candidates. Instead, they can actually grow the pie, increasing the number of qualified workers for sought-after jobs. The resulting increased racial and gender diversity in higher-paying jobs helps employers meet inclusion objectives and advances equity across the economy.

For many employers, drawing on front-line workers or on underemployed graduates may initially seem like a bridge too far. The idea of taking workers in low-wage jobs and transitioning them into coveted roles like project management specialist, software developer, and other high-wage positions can feel like modern-day alchemy – the Cinderella story of our time. But there's no magic to it. Apprenticeship is a singularly powerful mechanism for building skills and opportunities, step by step. In Europe, and increasingly in the US, jobs like these are filled based on skills, not degrees. That makes them well-suited to on-the-job training that builds on existing capabilities, the core feature of apprenticeships.

Part of what holds employers, educators, and others back is an outdated understanding of apprenticeship and the fields in which this model could be applied. In the US, apprenticeship has historically been limited to traditional skilled trades, like welding or carpentry. Today, the greatest potential for apprenticeship is no longer in the trades, but in a wide array of jobs that are emergent and growing in the knowledge economy. While technology skills are often of high value, high-wage jobs are by no means limited to technology fields, and are emerging and growing in number in many rapidly evolving occupations.

The application of new apprenticeship models to the specific labor market and policy context of the US is in its early days. With support from policy makers and researchers, more employers and industry associations are launching apprenticeship programs, but few have reached significant scale. To date, there has yet to be a deep assessment of which jobs are best suited to apprenticeships, and how current, robust European models might be applied in the US. This report takes up that challenge, and invites further inquiry and action.

# I. Executive Summary

Multiverse (MV) and The Burning Glass Institute (BGI) have collaborated on research to document and explore the nature of current and possible apprenticeships in a wide range of jobs in the US. The goal of this study is to evaluate the potential scope of apprenticeships beyond traditional trades and to identify key talent segments that could most benefit. We consider how a next generation apprenticeship structure in the US could reduce critical talent shortages, address the needs of the majority of US workers who are unable to access higher-wage work or underemployed in their job, and advance equity and opportunity.

**Too many workers are facing limited career progression options: 128 million workers – 76.2% of the US workforce – are underemployed, blocked in their careers, and otherwise in need of reskilling or upskilling opportunities.**

- **60 million workers would benefit from reskilling into better jobs.** Sixty million US workers are stuck in opportunity-limiting jobs. Three large cohorts of workers combine to make this total: 36.6 million high-churn, low-wage workers, many who are not college graduates; 10.6 million 18- to 25-year-old career starters who are not college graduates; 12.8 million underemployed college graduates. This large cohort of workers are disproportionately women, Black and Hispanic workers, and young adults. Many workers who do not have a bachelor's degree are held back by “the paper ceiling” – the arbitrary requirement for this credential, regardless of the skills of the worker.
- **68 million additional workers stand to make significant gains via upskilling opportunities.** There is an additional, vast group – some 68 million mid-career workers – seeking a chance for better pay and opportunities, most of whom are not college graduates. Often, they could

advance to higher-wage roles within their company or department if they had a chance to acquire additional skills within the context of their existing job or similar jobs that rely on their existing skillsets.

**The opportunity is real: 149 “target occupations” meet the standard for 21st century apprenticeships.**

Apprenticeships are no longer just about young people learning a skilled trade on the job. As workplaces and careers become more complex, apprenticeships are becoming a powerful tool for employers to attract talent and fill their skills gap, and for workers looking for upward mobility. By establishing essential criteria – such as good wages, demand for and growth of the occupation, absence of experience or education barriers, and the prevalence of on-the-job training – this study found 149 “target occupations” in the US, 20 of which already boast substantial and growing numbers of apprenticeship opportunities.

**Apprenticeships are a path to higher-skilled work.** Apprentice-ready occupations job postings specify more skills than others – 11 vs. a market-wide average of 7 – and are more likely to seek a college degree. Traditionally, these have been barriers but apprenticeship could be the key to providing an alternative model for qualifying talent.

**The scale of apprenticeships could be vast: A mature apprenticeship ecosystem would host over 830,000 US apprenticeship opportunities annually and pay tens of billions of dollars in increased annual wages:** Within these 149 identified target occupations alone, a fully mature US apprenticeship ecosystem would grow from approximately 50,000 current apprenticeship opportunities in these target occupations annually to over 830,000 apprenticeships per year in the US. This number would grow further with the introduction of apprenticeship pathways in additional occupations.

The earning consequences are remarkable: the average apprentice would see a \$34,000 increase in wages, resulting in a total of \$28.5 billion in new annual earnings.

**Workers in many roles can access new jobs across a large number of apprenticeship**

**“pathways”:** Mapping potential pathways uncovered opportunities for workers in 425 source occupations to move up through apprenticeship into one of the 149 apprentice-ready, target occupations. In each case, these pathways demonstrate high potential not only due to the skill similarity of workers pursuing these pathways, but also based on a proven history of workers successfully making these transitions. In connecting these 425 underleveraged talent pools and the 149 apprentice-ready occupations, we mapped 2,700 pathways for bridging the gap. Each pathway lays out the specific skills that a person in a source occupation, such as a medical records specialist, would need to learn to become a clinical data manager.

**Apprenticeships leverage talent and advance**

**equity:** The 60 million workers most likely to be trapped on a high-churn, low-wage treadmill and to find themselves trapped by the paper ceiling, underemployment, and lack of opportunity are disproportionately women, Black, Hispanic, or living with economic disadvantages. In fact, those working in roles identified as potential apprenticeship feeders are 27% more likely to

be Black, Indigenous, and other people of color (BIPOC) and 19% more likely to be female than their peers already working in the 149 apprenticeship targets. Because apprenticeship expansion draws on talent from this very diverse pool, successful implementations of such apprenticeships will result in increased diversity, equity, and inclusion for target occupations and for employers. In partnership with community organizations, employers can attract a diverse talent pool and build an inclusive talent ecosystem.

**Every organization has a role to play:** Employers can stop harming their own bottom line by denying workers who did not graduate college the high-paid jobs which people just like them are thriving in across the world. They can focus on skill development and potential versus pedigree, and use more on-the-job training – expanding on the 6.5x increase over the last five years in job postings that use terms like “upskilling, reskilling, and on-the-job training” in job ads to help attract talent. Policymakers can increase the use of funds from Pell grants, the Department of Labor, and the American Reconstruction Act to support and build apprenticeship-friendly programs and institutions, and support the bipartisan National Apprenticeship Act of 2023. Workforce development organizations and community and advocacy partners can work with national resource organizations and employers to foster apprenticeship ecosystems.

## A Glossary of Apprenticeship-Related Terms

**Apprenticeship** – A paid position within a firm or organization which provides the apprenticed person with an on-the-job learning opportunity at no cost to the apprentice.

**Apprenticeship-ready occupations** – Those occupations in the economy for which workers can readily become qualified through an apprenticeship, learning the needed skills on-the-job, and taking on a new job, or a new set of responsibilities in a more senior role. In general, an apprenticeship-ready occupation has a proven history of using apprenticeships and is a robustly growing occupation rather than a stable or shrinking one.

**High-churn, low-wage occupations** – Jobs which workers leave after less than 18 months and which pay less than \$17 per hour.

**Mobility** – The ability to move to a new job with comparable or better pay and improved prospects for career advancement.

**Pathways** – The routes – sometimes but not always mediated by an apprenticeship – between a source occupation and a target occupation.

**Source Occupations** – Source occupations are the jobs workers leave for higher-wage, or target occupations. Workers in a source occupation use an apprenticeship to train and qualify for a better job, or target occupation.

**Reskilling** – A process of training in new skills that can lead to new jobs with better pay and/or prospects; can lead to a new job within the same employer, in another company, or even in entirely new industries or sectors.

**Target Occupations** – The jobs to which workers aspire to advance, for which apprenticeships and the on-the-job training they offer can help workers get hired.

**Upskilling** – A process of training for current employees in new or enhanced skills to enable them to take on increased responsibilities or more senior jobs in the company, or even within their current department or team.

## II. Too many workers are stuck: Four cohorts of US workers, totaling 128 million people, are underemployed or treading water in low-opportunity roles, with limited options for advancement or mobility

Seventy-six percent of US workers currently find themselves with limited opportunities for growth in their job. This has serious consequences across the board. These workers are unable to advance professionally, have a stalled or stunted earning capacity, and often cannot see a promising way forward.

These workers can be divided into four groups:

- 36.6 million workers hold high-churn, low-wage jobs, such as fast food and retail sales positions.
- 10.6 million young workers are new entries to the workforce and haven't obtained a bachelor degree, which remains a pre-condition for employment in a wide swath of the economy; their careers are limited by "the paper ceiling."
- 12.8 million underemployed college graduates have a job that does not draw on the skills they acquired with their college education and that offers few pathways to better employment.
- 68 million mid-career workers are facing limited progression opportunities and would be well-suited by pathways to transition into target occupations or upskill within their own fields.<sup>1</sup>

### Workers in low-wage, high-churn jobs make up a major portion of the workforce and face daunting prospects

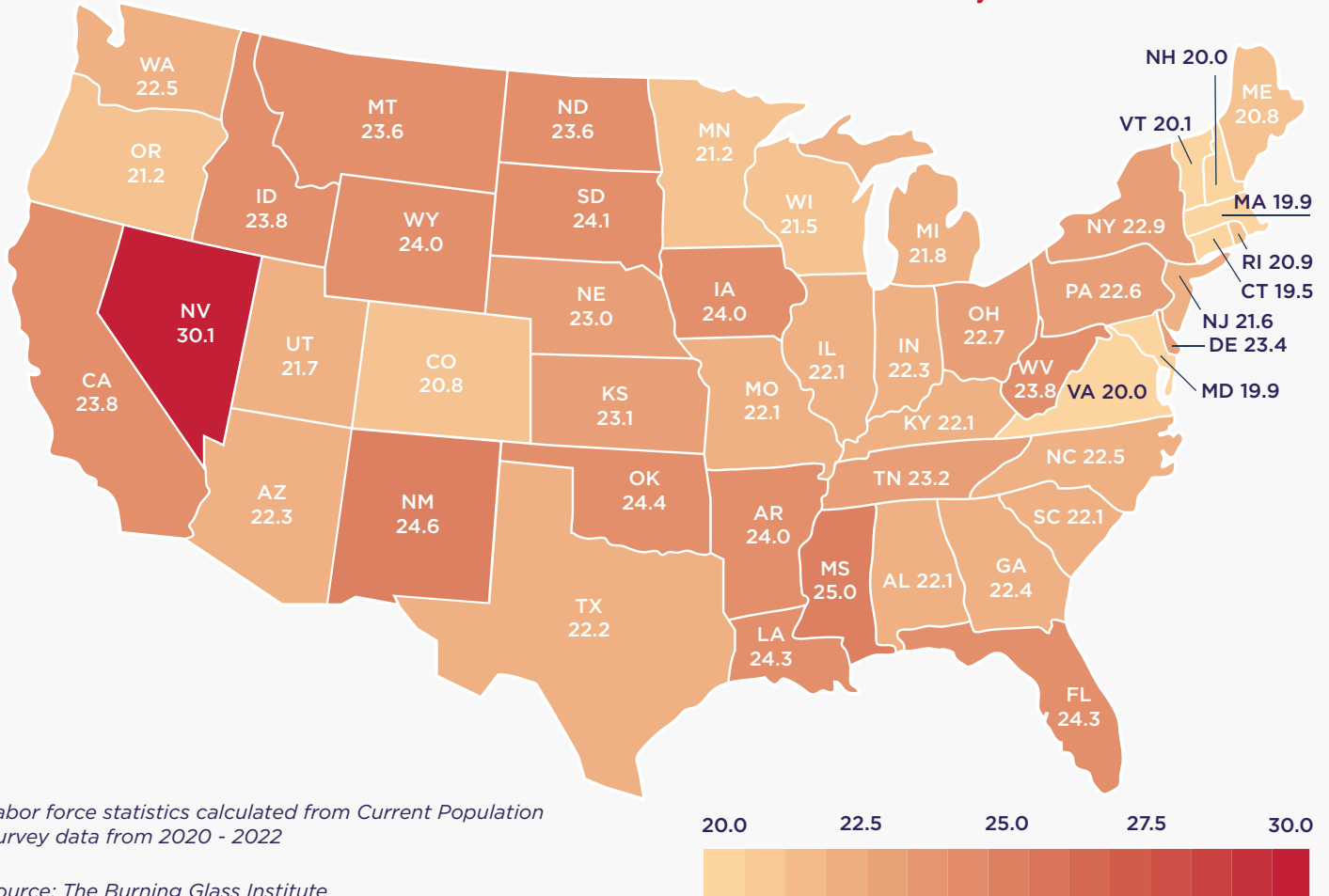
Thirty-six million workers – roughly 21% of the US workforce – are caught in high-churn, low-wage jobs that fail to recognize or develop human potential and make limited use of the skills workers have. In high-churn jobs, workers on average stay for fewer than 18 months; a low-wage job pays \$17 per hour or less. Workers in these roles – fast food workers, drivers, retail salespeople, cashiers, cooks, janitors, and many others – struggle to find their way to a higher wage or more stable, long-term employment.

High-churn, low-wage work negatively affects employers, workers, and local and regional economies everywhere in the US. These jobs are widely and fairly evenly distributed across the country, regardless of region, in urban, rural, and suburban settings alike. Remarkably, in any state, the proportion of workers who work under these conditions hovers consistently between a minimum of 20% and a maximum of 30%.

Without interventions like apprenticeships, these workers face challenges in accessing higher-wage work. They are generally not getting raises or meaningful access to retirement or benefits. Most importantly, they lack a way out: as employers struggle to appropriately recognize the transferable skills built on the job. Consequently, the high-churn low-wage cycle is not something that corrects itself over time, or that fades to insignificance through the arc of a career. It is a problem with lasting consequences in tens of millions of lives.

## Where are the 36 million + high-churn, low-pay workers?

20% to 30% of the workforce in each state are in these jobs



### How we define high-churn, low-wage jobs: ↩

- Low-wage was defined as workers with a median hourly wage of \$17 or below (25th percentile of workers) according to the May 2022 reporting of the U.S. Bureau of Labor Statistics' Occupational Employment and Wage Statistics.

According to the United Way's ALICE wage tool, this threshold coincides with being in the bottom tercile of wage earners in the US.

- High churn was defined as workers with a median job tenure of 18 months or less.

There is also a large equity problem tied to this phenomenon: the problem of being in a high-churn low-wage job is inequitably distributed by race, immigration status, and gender. BIPOC, foreign-born, and female workers disproportionately hold these low-wage, high-churn jobs compared to their share of the US population as a whole, while comprising a disproportionately low share of higher-paying jobs like those represented by these target apprenticeship occupations today.

High-churn low-wage jobs are not concentrated in one sector or small number of jobs. To the contrary: a wide variety of industries and employers experience severe pain points as a result of the workforce instability caused by these jobs. The chart below documents the 20 jobs in which 80% of high-churn low-wage workers are employed; each occupation is an excellent candidate for apprenticeship strategies.

	All High-Churn, Low-Wage Jobs	All Target Jobs
% BIPOC	48.9%	35.6%
% Female	52.7%	42.7%

## High-churn, low-wage roles that could benefit from apprenticeships

### Number of workers in the top 20 most common high churn. Low-wage occupations



Source: The Burning Glass Institute



Finally, workers in high-churn low-wage jobs are more vulnerable to automation than others. With the acceleration and maturation of AI-based technologies, many workers and employers are rightfully concerned about the automation susceptibility of their jobs. Recent anxiety focuses on Large Language Models, which are projected to affect college-educated workers most. However, those in low-wage, high-churn jobs also face the looming threat of automation. In a key study, Frey

and Osborne developed a measure to evaluate the probability of automation for occupations due to computerization. BGI adapted existing studies of automation exposure<sup>2</sup> to evaluate the automation susceptibility of jobs included in this study. The resulting analysis shows that the identified high-churn, low-wage occupations are far more susceptible to automation than other apprenticeship-ready occupations.

## How automation will impact these workers

### Automation risk is much greater for workers in high churn, low-wage occupations

Top High Churn, Low-Wage Occupations	Automation Probability
Driver/Sales Workers	High
Retail Salespersons	High
Cashiers	High
Janitors and Cleaners	High
Cooks	High
Waiters and Waitresses	High
Packers and Packagers	Medium
Maids and Housekeeping Cleaners	High
Receptionists and Information Clerks	High
Childcare Workers	Low
<b>Average</b>	<b>High</b>

Apprentice-able Occupations	Automation Probability
Software Developers	Low
Computer Systems Engineers/Architects	High
Human Resources Specialists	Medium
Computer Systems Analysts	Low
Project Management Specialists	Medium
Market Research Analysts	High
Financial and Investment Analysts	Low
Medical and Health Services Managers	Low
Industrial Engineering Technologists	Low
Management Analysts	Low
<b>Average</b>	<b>Low</b>

## Over 10 million early career workers who don't have a bachelor's degree can't access many high-wage, high-mobility jobs because those jobs are gated behind bachelor's degree requirements

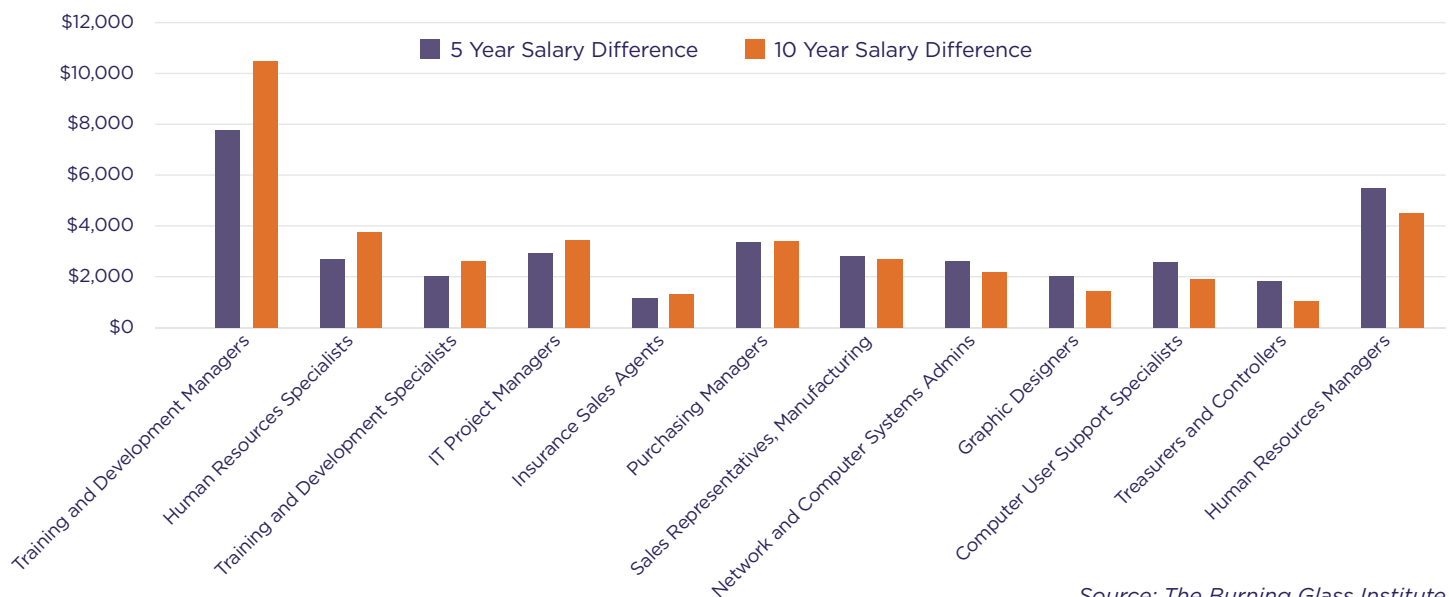
There are 16.2 million people aged 18 to 25 who are not enrolled in school and do not have a bachelor's degree. Of these, approximately 5.6 million people are currently employed in one of the high-churn, low-wage occupations described above. The remaining 10.6 million early career workers are subject to "the paper ceiling" - the persistent practice by employers of requiring a bachelor's degree for many jobs, without regard to whether it is the best preparation for the job, or whether those without this credential might nevertheless have the skills and capacity, or the clear potential, to do the job well. More than a quarter of all jobs have a hard requirement for at least a bachelor's degree, regardless of the skills needed. Further, jobs that require a degree tend to be the best-paid, with the best long-term prospects.

While the share of job ads requiring a bachelor's degree has declined in the past decade, it remains a stubborn default position for many employers, a clear barrier to the advancement and performance of millions of workers.<sup>3</sup> Ironically, employers who use this gatekeeping practice harm their own bottom line by limiting their access to the full breadth of talent in their own employee pool, as well as the wider workforce. Evidence from the UK and the US shows that with the work experience and on-the-job training that apprenticeships provide, workers who don't possess a bachelor's degree can excel in many jobs that are currently unavailable to them - often more quickly than their degreed counterparts.<sup>4</sup>

### Wage disparities for workers who are not college graduates are persistent

*Even after 10 years in the same occupation, workers with BAs retain a significant wage lead - in some cases widening over time*

**Salary disparity for non-BA workers over time**



Source: The Burning Glass Institute

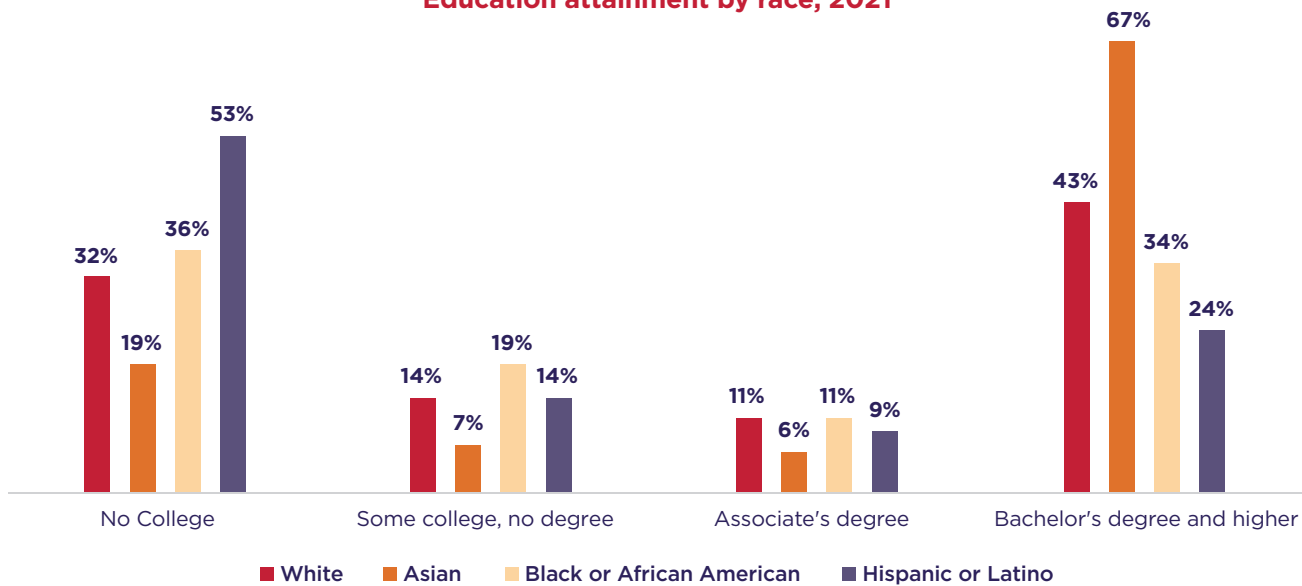
These workers are paid less than their peers who have a bachelor's degree. In some occupations, those wage disparities widen over time. For example, whereas a Training Manager without a degree makes \$8,000 less than a degreed peer after five years on the job, the difference increases to \$10,000 after 10 years.

The arbitrary bachelor's degree requirement is a major barrier to equity for another reason. Historical inequities have led to lower degree attainment among Hispanic and Black populations.

Only 24% of Black people and 34% of Hispanic people hold a bachelor's degree or above; the number for white people is 43%. When combined with employer-imposed degree barriers, these disparities have the effect of significantly reducing access to high opportunity jobs for workers from historically underrepresented backgrounds. As alternative paths, apprenticeships serve not only to increase diversity in traditionally higher-skilled occupations, but also to level the playing field for Black and Hispanic workers.

### Alternative paths to jobs are not just a talent imperative, but also an equity imperative

Education attainment by race, 2021



Source: Burning Glass Institute analysis of American Community Survey data

## **12.8 million bachelor's degree-holding workers are underemployed, stuck in jobs that offer limited future prospects**

Bachelor's degrees are supposed to create access to higher-paid jobs, but for many workers who complete their studies, this investment isn't paying off. According to a forthcoming BGI analysis of job postings data, career history profiles, and the American Community Survey, as of 2023 there are 12.8 million workers with a bachelor's degree who, despite investing their time and resources toward obtaining a degree, are working in low-paying jobs that don't utilize the skills obtained in their studies. Workers with a bachelor's degree comprise 16% of food servers, 19.6% of telemarketers, 26.5% of retail sales workers, and nearly half (49%) of computer user support specialists.

The problem is widespread, affecting workers at multiple stages of their working lives. Fifty-three percent of college graduates are underemployed one year after graduation. These workers aren't obtaining the employment outcomes that pursuing a degree is meant to deliver. Further, the problem can prove very hard to overcome: most workers who start their careers in this way stay underemployed for the long-run. This challenge is not limited to those fresh out of college, but is faced by workers who have several years in the workforce, in a wide range of jobs. They are experiencing sustained underemployment, not a temporary situation or a rough job start.

## **An estimated 68 million additional workers who are not college graduates are in mid-career roles with limited progression pathways, and are in need of opportunities to upskill.**

The largest cohort of the 128 million workers studied are the vast pool of mid-career workers in a wide array of roles who stand to gain significantly from an infusion of new skills. Perhaps they've hit a dead end in occupational progression, have been in the same

job for a long time, or are in a working environment where opportunities for advancement are not widely available. Their wage growth may be stagnant, or there may be few other employers in the town or region in which they live. Mostly, they do not have a bachelor's degree. They might be a bookkeeper, an office administrator, a health technologist, a lab technician, or have one of dozens of other occupations. Each of them experiences severely limited options for increasing their income or mobility.

This group of workers presents a special case, because their need can be for upskilling either within an occupation or reskilling to gain access to a new occupation. Like those with a bachelor's degree who are underemployed, or those in high-churn low-wage jobs, they need additional skills and experiences that will make them eligible for better-paid work with greater prospects for advancement. But unlike these other workers, who are often learning skills for entirely new roles that may also take them to new departments or even new employers, the focus for these workers can be on increasing their capacities within their current job, or in a new job within the same office or department of their company.

The group is also special because it is so extraordinarily large. While this means that the upskilling opportunity is broad-based, it also signals the scale of the challenge. The anticipated introduction of new technologies into work will likely exacerbate the need for experienced workers to obtain new skills to keep up and advance at work. For these workers, new skill-building and training paths could be the means to advancement to better jobs with better pay.



## **What is an Apprenticeship, Exactly, and Why Does it Matter to Employers and Workers?**

### **What is an apprenticeship?**

An apprenticeship is a paid position within a firm or organization which provides the apprenticed person with an on-the-job learning opportunity at no cost to the apprentice. Workers in apprenticeships can be newly retained or incumbent, and at different stages of a career (entry level, early-career, or mid-career). They can have no degree, some college, a bachelor's degree; sometimes even a master's degree. They can be an early career starter looking for a new role, an established worker seeking a way of upskilling to take on a new role in their existing department or team, or a worker at any stage hoping to reskill, and move laterally to another job, department, or occupation. Apprenticeships can last for a fixed, predetermined period, or they can be focused on the achievement of competencies in specific skills, without a fixed time limit.

### **How can apprenticeships meet the needs of employers and workers?**

Apprenticeships serve a range of purposes for employers and workers. Employers use them to close difficult skill gaps in their workforce, increase their gender and racial diversity, and change the culture of their organizations. Apprenticeships allow organizations to identify internal or external candidates, and make on-the-job learning a more central and respected form of skill-building. They address talent shortages by helping employers abandon the flawed but tenacious tradition of overly relying on credentials. Apprenticeships speed workers along an ever-increasing number of pathways to better jobs, which are often the roles employers struggle to fill. Evidence strongly demonstrates that apprenticeships can increase performance. In short, they help a broad range of employers reach a diversity of goals.

Workers use apprenticeships to build on existing skill sets and acquire new competencies. The goal of an apprentice is permanent employment in a new role, with increased wages and improved long-term earning prospects. Organizations offer apprentices structured upskilling and workplace learning experiences, supported by designated employees or teams. For incumbent or mid-career workers who can't access upward mobility, apprenticeships are frequently a way up. For those newly or recently entering the workforce, an apprenticeship can be an expedited pathway to advancement. Apprenticeships generate opportunities for Black, Hispanic, female, and older Americans to compete on a level playing field and gain historically denied access to economic and professional power.

### III. The apprenticeship opportunity is real: 149 “target occupations” meet standards for 21st century apprenticeships, and 20 of those occupations already offer significant numbers of apprenticeships

#### *Key Criteria for an Occupation’s Apprenticeship-Readiness*

Drawing on Multiverse’s experience helping companies create and support apprenticeship programs, this study relied on a clear set of criteria to use in determining which jobs are best suited to apprenticeships.

In order to qualify as an apprenticeship-ready occupation, jobs must:

- Consistently pay more than \$20 per hour.
- They must be in demand, with the number of jobs in the occupation steadily growing.
- They should be open to a person without a bachelor’s degree who can learn the needed

skills through apprenticeship and by bringing to bear their existing skills.

- They must require no more than five years of related experience.
- They and the employers who offer them should make good use of on-the-job training, for which apprenticeships serve as an excellent context.

With these priority criteria in mind, this report relied on the following specifications in order to begin the process of identifying apprenticeship-ready occupations.

#### **Apprenticeships are already closing the skill gap**

##### *What jobs already have apprenticeships in the US that fit our criteria?*

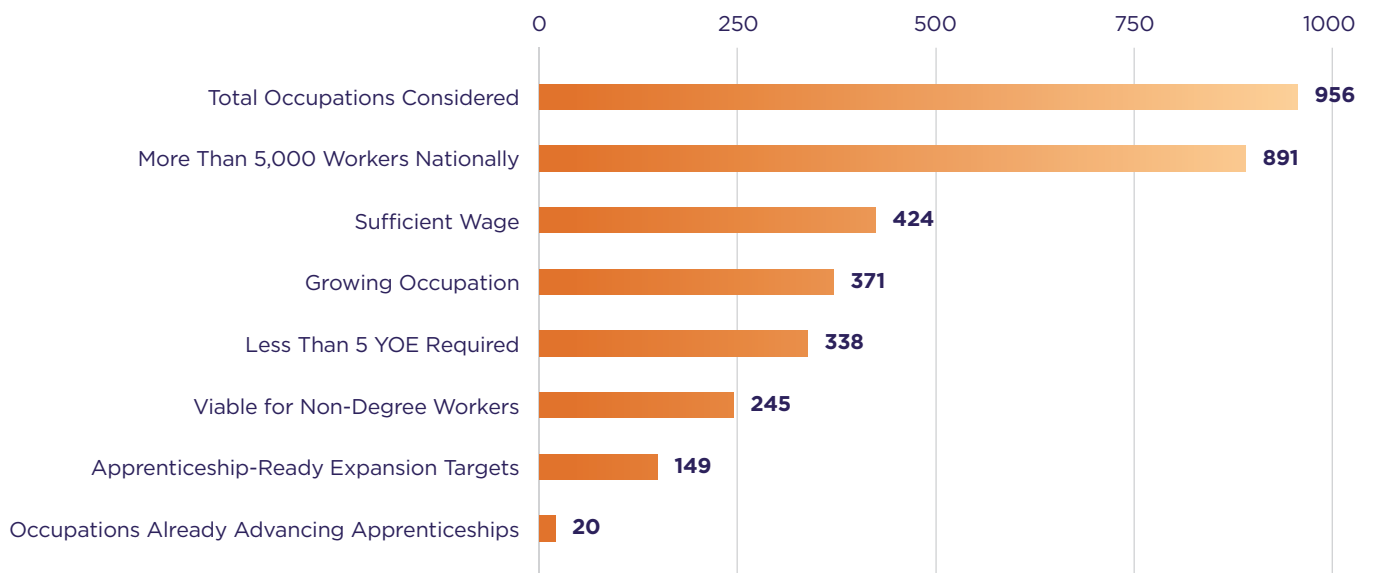
- **Good wages:** Workers in the 25th percentile in target jobs must earn an hourly wage of at least \$20/hour according to the most recent BLS OES data.
- **Demand and growth trajectory:** Target jobs should be in demand with an expected growth trajectory of 5% or more from 2021 to 2031.
- **Accessible without a BA:** Target jobs shouldn’t typically require a bachelor’s degree according to BLS, or, in cases where they do typically require a bachelor’s degree, at least 1 in 8 (12.5%) job postings must require only a high school diploma or associate’s degree according to our postings data.
- **Accessible without related experience:** Jobs typically require no more than five years of related experience.
- **On-the-job training:** These jobs typically require medium-term, short-term, or no on-the-job training.
- **Already hosts apprenticeships:** In 2022 there were over 500 US job ads for apprenticeships in this occupation.

### Fitting the Chosen Criteria

Using precise statistical definitions of the criteria which render an occupation apprenticeship-ready, BGI tested all 956 occupations to see which ones would meet those standards.<sup>5</sup> More than 15% – 149 occupations in total – did meet the standard. They are what are termed “target occupations.” Of these, 20 occupations are already hosting apprenticeships in significant numbers.

While not all apprenticeships meet the criteria set for this study, it is noteworthy that from 2017 to 2022, BGI observed a 160% growth in job ads for apprenticeships in the US. In 2022 alone, there were nearly 250,000 apprenticeship job ads across US employers. Within the much smaller cohort of 149 occupations deemed apprenticeship-ready, roughly 50,000 apprenticeships occur in a given year.

### By testing 956 occupations, BGI identified 149 which are apprenticeship-ready, and 20 that already host apprentices



Source: The Burning Glass Institute

### Initial lessons from data on apprenticeship-ready occupations

With 149 apprentice-ready occupations and 20 of those already featuring tens of thousands of apprenticeship opportunities annually in the US, we

studied these occupations more closely to identify what makes an occupation a prime candidate for apprenticeship pathways. Several insights emerged.

## Some US occupations are already advancing apprenticeships

These 20 occupations represent over 30,000 apprenticeship job opportunities each year

### Job postings for US apprenticeships, 2022



*From 2018 to 2022, the share of apprenticeship postings within these occupations nearly tripled, on average, with some occupations like Sales Manager, Operations Research Analysts, and Computer Systems Architects seeing 5x or greater growth.*

Source: The Burning Glass Institute



## IV. Apprenticeships are a path to higher-skilled work

The jobs that are most apprenticeship-ready tend to be the most skill-defined, where workers with the right skills deliver outsized value in their roles. The average job advertisement for an apprenticeship-ready occupation lists 11 skills; for all other occupations the average is 7 skills. This both reflects

the importance to employers of skilled workers in the most apprenticeship-ready occupations and explains why apprenticeship – with its design emphasis on applied, on-the-job training and on progressively building a portfolio of skills – is such an effective mechanism at readying people for these jobs.

### What makes apprenticeship-ready jobs different?

The average apprenticeship occupation has one major difference from non-apprenticeship jobs: it requires more skills. On average:

**+4 More Skills  
Are Needed in  
Apprenticeship-  
Ready  
Occupations**

These results suggest that the jobs more poised for apprenticeships require more on-the-job training; experience in other fields or a degree are less likely to prepare workers for the needs of these roles.

#### Top Software Engineer Skills [Apprentice-able]

Scripting Languages

Web Design and Development

Web Services

Test Automation

IT Automation

Software Development Tools

Application Programming  
Interface (API)

C and C++

Other Programming Languages

Version Control

JavaScript and jQuery

Java

Microsoft Development Tools

#### Top Computer Network Architect Skills [Not Apprentice-able]

General Networking

Network Security

Network Protocols

Networking Hardware

Telecommunications

Systems Administration

Virtualization and Virtual  
Machines

Wireless Technologies

Networking Software

*Most important skills to each occupation based on US job advertisements. Only includes skills that appear with enough frequency to meet BGI skill importance threshold.*

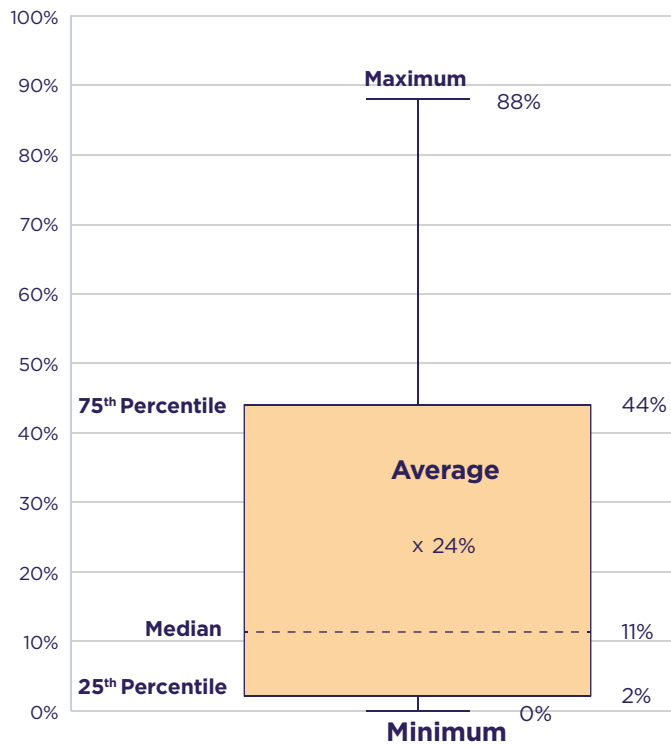
Bachelor’s degree requirements show up more often in apprenticeship-ready occupations than in others. This finding highlights the potential for apprenticeships to “tear the paper ceiling”

in the very occupations that are most amenable to, and ready for, an apprenticeship approach.

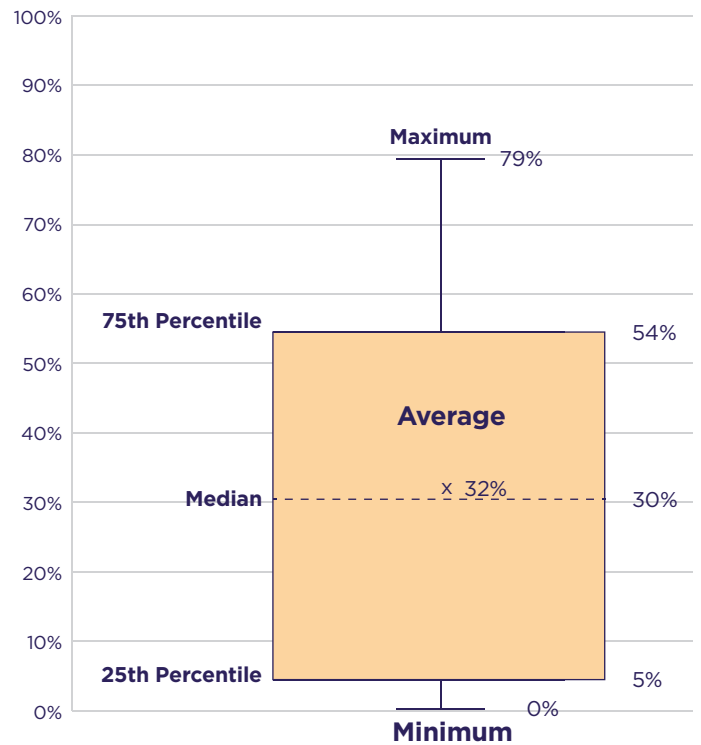
## Many BA requirements in apprenticeship-ready occupations

*Jobs in apprenticeship-ready occupations are 34% more likely to require a degree*

**Non-apprenticeship occupations**  
Share of job ads requiring a BA



**Apprenticeship occupations**  
Share of job ads requiring a BA



Source: The Burning Glass Institute

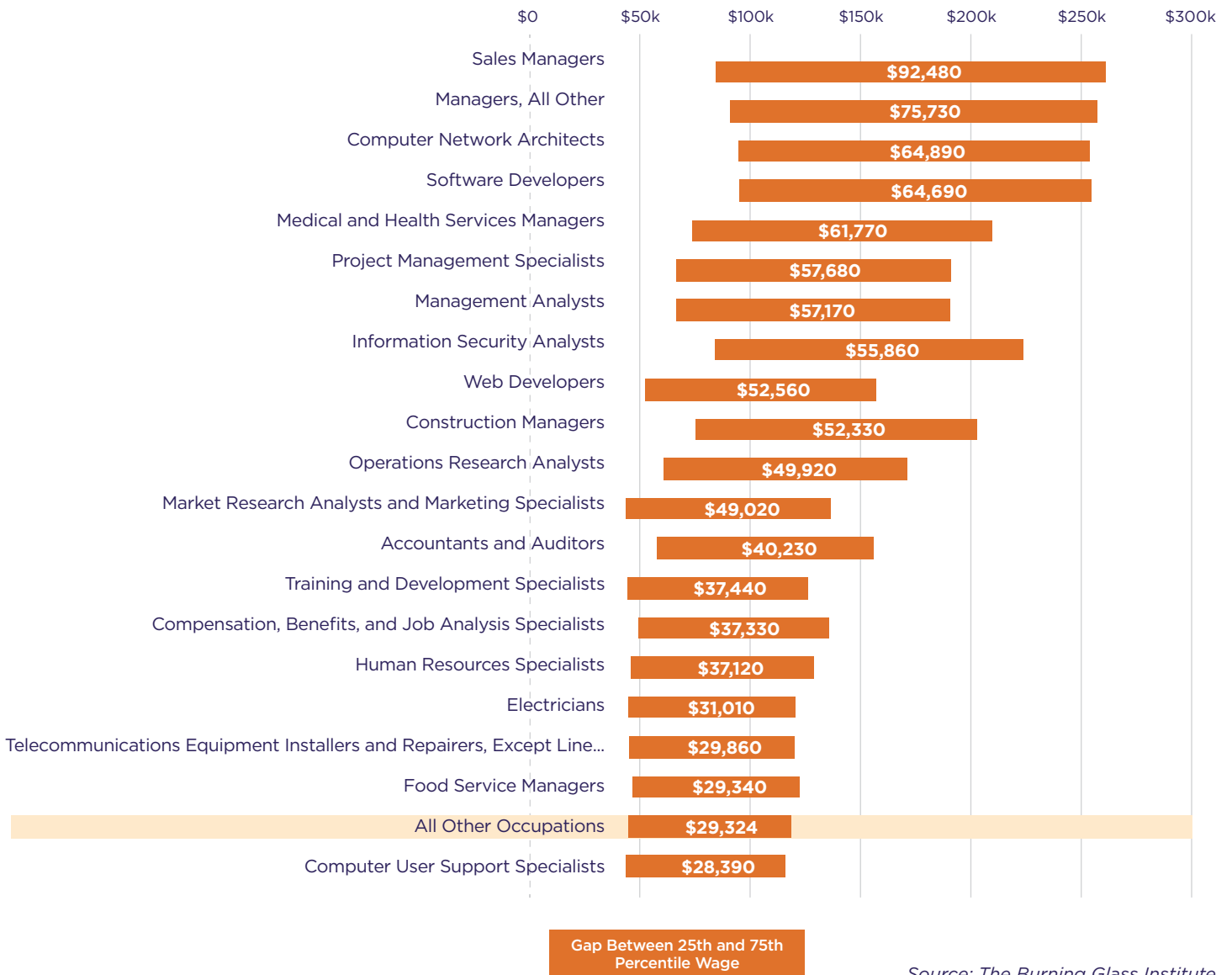
BGI/MV’s study of average dispersion of wages – between low earners and high earners working in the same occupation – documents a very broad range in how much people are paid within apprenticeship occupations. That’s important because it reflects the potential to grow wages over time by continuing to accrue new skills and build increasing mastery of existing ones – key

facets of the design of apprenticeships which build capability over time. Workers who advance their training through apprenticeships can clearly earn much higher wages. Further, while wages vary a great deal, skills are clearly rewarded with higher pay. Economists call this a “greater return to skills”: compared to other jobs, these occupations reward the most skilled workers in a substantial way.

### Apprenticeship-ready occupations feature significant wage dispersion

19 of 20 apprenticeship-ready occupations have a wider wage dispersion than other occupations, indicating that people in these jobs have access to excellent wage possibilities.

#### Wage dispersion: salary range and gap between 25th vs 75th percentile wages



Source: The Burning Glass Institute

## **V. The scale of apprenticeships could be vast: In a mature apprenticeship ecosystem, 830,000 apprentices would increase their wages by \$28.5 billion**

These numbers are substantial. Here is how they emerged from the research.

As noted above, of 149 occupations that meet criteria for apprenticeship, only 20 host significant numbers of apprenticeships. That leaves 129 occupations with significant untapped potential. With an average of only 1,500 apprentices nationally in each of the 20 currently apprenticed occupations, there may be significant room for additional apprenticeship in these roles as well.

In order to understand the potential of apprenticeships to grow and become a well-established portion of the US workforce economy, this report considers what might constitute a “mature” or fully developed ecosystem of apprenticeships in any given occupation. An analysis of learnings from other geographies in which apprenticeships are a more established route to work proved fruitful. The UK has a long history of apprenticeships across a wide range of occupations, while the US has a nascent, though rapidly growing, apprenticeship ecosystem. Using

the rate of apprenticeships in the UK economy as a whole, and applying it to these 149 target apprenticeship occupations, the analysis estimates that the US workforce would host over 830,000 new apprenticeship opportunities per year, at maturity. Note that this total would only include apprenticeships in the 149 initially identified target expansion occupations, and exclude some occupations which currently host apprenticeships in the US but do not meet the wage thresholds established for this study. Assuming that more occupations will and should be targeted for apprenticeship over time, the mature apprenticeship ecosystem could grow much larger.

To assess the financial impact of such growth, we analyzed the pay increases observed in current apprenticeship transitions. The average pay increase is \$34,250, across the broad set of pathways detailed in this study. Applied to the 830,000 figure, this generates an estimated \$28.5 billion per year in wage increases driven by apprenticeship opportunities.

## What would a mature US apprenticeship ecosystem look like?

Occupation	Job Postings 2022	Apprentice Postings 2022	Projected Mature Apprenticeship Postings	Expansion Opportunity
Software Developers	1,263,006	2,521	56,835	54,314
Managers, All Other	628,187	1,660	28,268	26,608
Human Resources Specialists	606,867	1,671	27,309	25,638
Medical and Health Services Managers	550,640	733	24,779	24,046
Food Service Managers	481,244	779	21,656	20,877
Management Analysts	465,398	912	20,943	20,031
Accountants and Auditors	441,652	534	19,874	19,340
Project Management Specialists	415,805	618	18,711	18,093
Computer User Support Specialists	425,480	1,459	19,147	17,688
Market Research Analysts and Marketing Specialists	356,946	724	16,063	15,339
Computer Systems Engineers/Architects	293,188	561	13,193	12,632
Sales Managers	354,288	3,516	15,943	12,427
Web Developers	257,663	512	11,595	11,083
Operations Research Analysts	274,198	1,520	12,339	10,819
Construction Managers	174,066	711	7,833	7,122
Information Security Analysts	170,836	748	7,688	6,940
Training and Development Specialists	158,466	850	7,131	6,281
Compensation, Benefits, and Job Analysis Specialists	155,316	1,604	6,989	5,385
Telecommunications Equipment Installers and Repairers, Except Line Installers	78,696	1,823	3,541	1,718
Electricians (already mature)	87,699	9,968	3,946	0

## **VI. Workers in many roles can use apprenticeships to access new jobs, through a range of pathways**

In identifying optimal pathways to new jobs, powerful evidence comes to the fore: nearly 2 million workers have recently taken pathways between one of the identified source occupations and a target job, demonstrating the value and feasibility of these pathways, even without mature apprenticeship ecosystems to support them.

Having identified 149 occupations as apprenticeship-ready, we set out to chart the full range of transitions into those occupations in order to track which occupations workers are moving up from. To identify source occupations where transitions to new targeted jobs were actually taking place, this analysis set a minimum threshold of successful transitions required to qualify, and further limited the pool to transitions that represented real opportunities for workers, with documented evidence of success.

The team identified 425 source occupations which require core skills sets that align with at least one of the 149 target occupations. A worker in one of these source occupations would need to acquire new and valuable skills on the job in order to make the transition to one of the target jobs. This led to the identification of 2,700 different pathways by which workers in one of these 450 source jobs could progress to one of the 149 identified apprenticeship-ready target occupations.

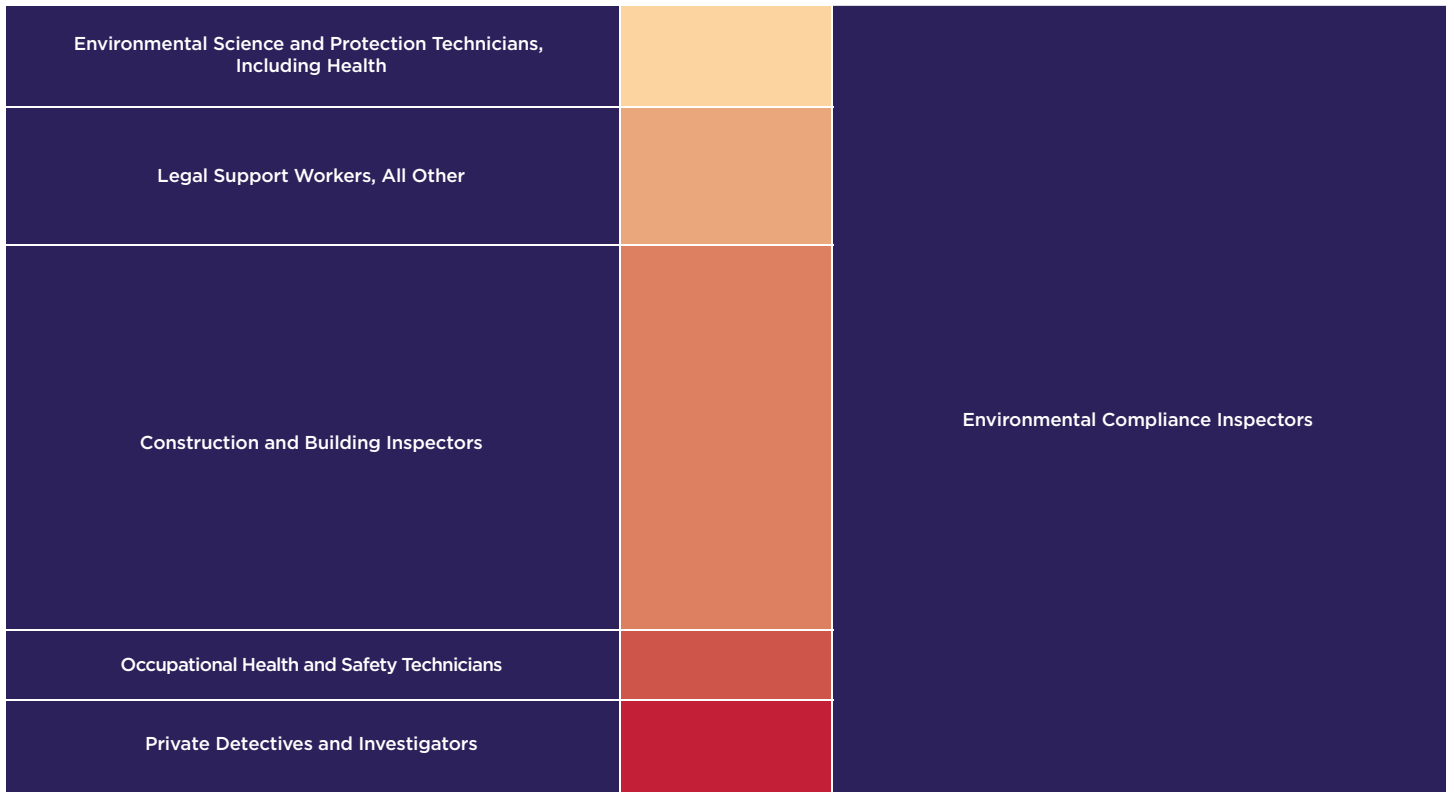
As the graphics below illustrate, each pathway involves acquiring a meaningful set of new skills that represent the highest-value training opportunities for workers making the transition – many of which can be learned in on-the-job training and in the form of apprenticeships. At the same time, each graphic clearly defines multiple source occupations from which candidates for new roles could reasonably advance. Together, these figures illustrate that there is no shortage of occupations from which one can move to new and better employment, if one has the right skills.

The research makes clear that while these pathways exist, most are underutilized, and any significant forward motion will require increased flow of talent through them. In this way, employers can discover new source roles from which to recruit, and develop new pathways for workers in those source jobs, and open up access to target jobs for millions of workers who could fill them if afforded the opportunity.

The charts below highlight the degree of similarity between the source job and the target job, which helps both employers and workers to filter out those pathways that are less likely or advisable and bring focus to those that are most likely and promising.

## Example: Environmental Compliance Inspector

Band sizes are scaled based on source occupation employment levels per BLS' 2022 OES Data. Similarity ranks are based on analysis of task and skill similarities determined by O\*NET occupation and job postings data.



Feeder occupation

Target occupation

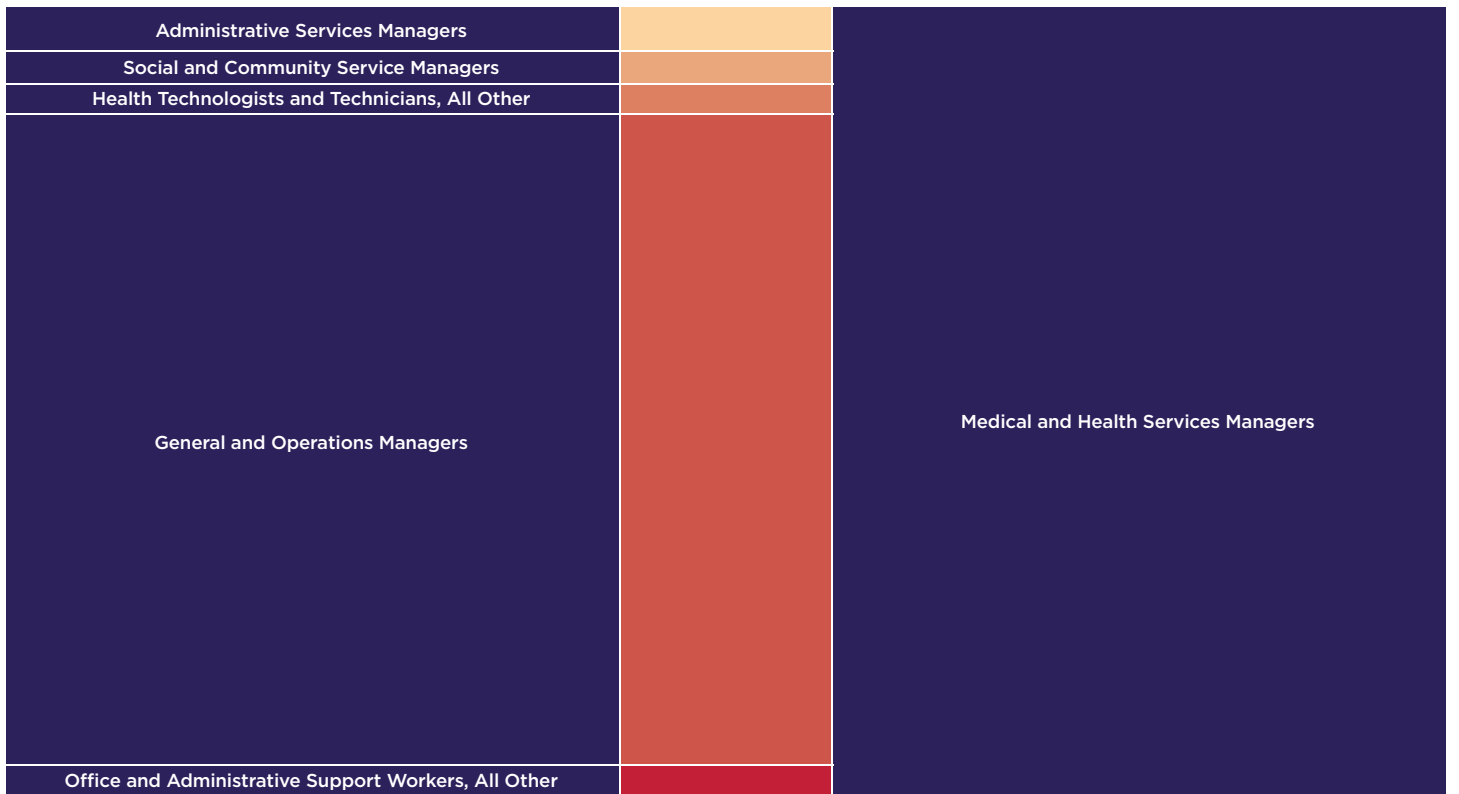
Similarity rank 1  2  3  4  5 

Source: The Burning Glass Institute

Source Occupation	Top Skill Gaps Between Source and Environmental Compliance Inspector
<b>Construction and Building Inspectors</b>	Environmental Regulations; Environment and Resource Management; Air Quality and Emissions; Roads and Drainage; Environmental Engineering and Restoration; Water Supply, Testing, and Treatment; Waste Management
<b>Environmental Science and Protection Technicians, Including Health</b>	Environmental Regulations; Roads and Drainage
<b>Legal Support Workers, All Other</b>	Environmental Regulations; Roads and Drainage; Environment and Resource Management; Air Quality and Emissions; Environmental Engineering and Restoration; Water Supply, Testing, and Treatment; Waste Management
<b>Occupational Health and Safety Technicians</b>	Roads and Drainage; Environmental Engineering and Restoration; Air Quality and Emissions; Environmental Regulations; Geological Engineering
<b>Private Detectives and Investigators</b>	Environmental Regulations; Roads and Drainage; Environment and Resource Management; Air Quality and Emissions; Environmental Engineering and Restoration; Water Supply, Testing, and Treatment; Waste Management

## Example: Medical Services Managers

Band sizes are scaled based on source occupation employment levels per BLS' 2022 OES Data. Similarity ranks are based on analysis of task and skill similarities determined by O\*NET occupation and job postings data.



Feeder occupation

Target occupation

Similarity rank 1 2 3 4 5

Source: The Burning Glass Institute

Source Occupation	Top Skill Gaps Between Source and Medical Services Managers
<b>Administrative Services Managers</b>	Nursing and Patient Care; Health Care Administration; Health Care Procedure and Regulation; Patient Education and Support; General Medicine; Health Information Management and Medical Records; Emergency and Intensive Care
<b>General and Operations Managers</b>	Health Care Procedure and Regulation; Nursing and Patient Care; Health Care Administration; Patient Education and Support; General Medicine; Health Information Management and Medical Records; Emergency and Intensive Care
<b>Health Technologists and Technicians, All Other</b>	Health Care Administration; Health Care Procedure and Regulation; Performance Management; Patient Education and Support; Budget Management; Nursing and Patient Care; Process Improvement and Optimization
<b>Office and Administrative Support Workers, All Other</b>	Health Care Procedure and Regulation; Nursing and Patient Care; Health Care Administration; Patient Education and Support; General Medicine; Performance Management; Process Improvement and Optimization
<b>Social and Community Service Managers</b>	Health Care Procedure and Regulation; Health Care Administration; Nursing and Patient Care; Patient Education and Support; Process Improvement and Optimization; General Medicine; Health Information Management and Medical Records

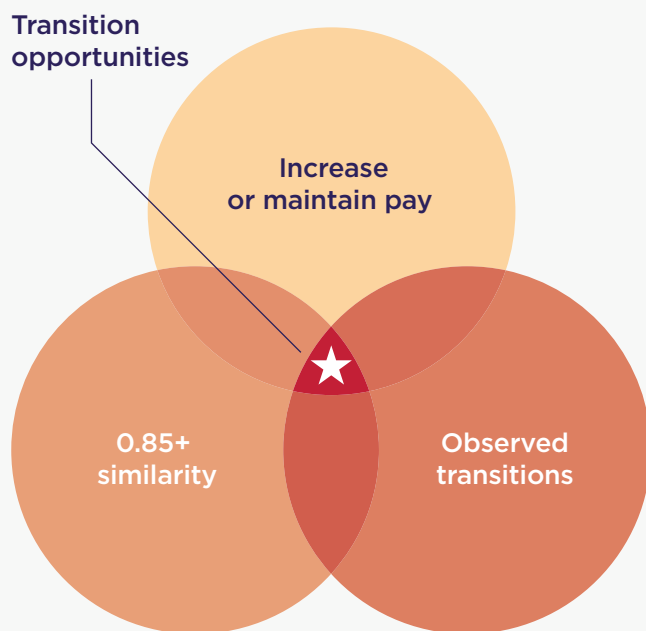


## Underemployed workers with bachelor’s degrees also have a clear set of pathways to better jobs

The goal in supporting underemployed workers with bachelor’s degrees is to identify transition pathways to higher paying target occupations. We identified over 700 viable pathways to such jobs – transitions that involve equal or greater pay, sufficient skill similarity to make closing gaps feasible, and considerable history of actual real-world transitions.

### Using role similarity models to bridge the gap

#### Identifying source to target transitions



We use three key criteria to determine the viability of a transition from a source occupation (where workers are underemployed) to a target BA apprenticeship occupation.

- **Pay:** Workers need to maintain or increase their pay for a transition to even be attractive
- **Observed Transitions:** We need to have seen workers make this transition in our data
- **Role Similarity:** Based on BGI algorithms for identifying similar occupations based on both their tasks and the most important skills for performing these tasks, we can identify where workers already have most of the skills available to make the transition

### Example: Customer Service Representative transitions

Source	Source Salary	Target	Target Salary	Observed Transitions	Task Similarity	Skill Similarity	Total Similarity
Customer Service Representatives	\$37,780	Business Operations Specialists	\$75,990	8,936	85%	89%	88%
Customer Service Representatives	\$37,780	Sales Managers	\$130,600	21,372	82%	89%	87%
Customer Service Representatives	\$37,780	Human Resources Specialists	\$64,240	6,689	81%	88%	86%
Customer Service Representatives	\$37,780	Training and Development Specialists	\$63,080	3,209	80%	89%	85%
Customer Service Representatives	\$37,780	Market Research Analysts and Marketing Specialists	\$68,230	6,331	81%	87%	85%

# Transition paths into generalist business roles

Thicker bands represent greater pools of underemployed workers. Similarity ranks are based on analysis of task and skill similarities determined by O\*NET occupation and job postings data.

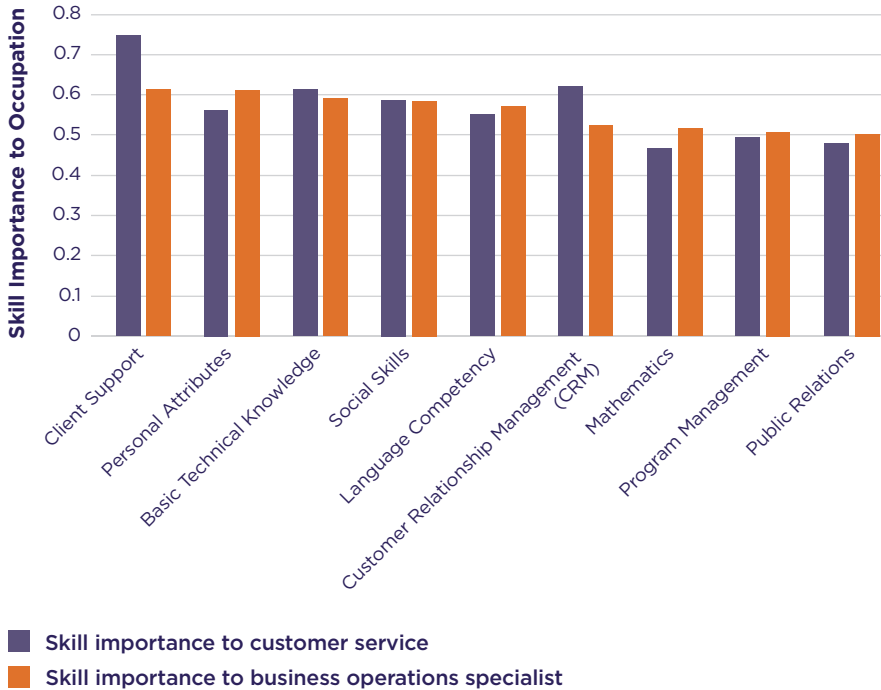


Source: The Burning Glass Institute

## Apprenticeships to bridge the skill gap

Customer service representative to business operations specialist

### Top shared skills: customer service and business operations specialist



### Top skill gaps: customer service to business operations specialist



Source: The Burning Glass Institute

### Case Study: apprenticeship pathways at box



In the tech world, competition for candidates is fierce, and retention is vital, as businesses look to grow their talent internally. To establish a strong early talent pipeline, Box, a leading cloud content provider, turned to Multiverse to build professional apprenticeships. Attracting young people with a demonstrated interest in building a career in tech, Box now offers a software engineering boot camp, where apprentices practice critical project management skills, master tech skills, and receive coaching in JavaScript, SQL, and HTML. Through the program, Box apprentices provide valuable impact to the Box engineering department.

Box has seen an increase in productivity gains due to new skills gained and applied by apprentices. In one case, an apprentice was able to temporarily take on manager level responsibilities, which allowed their manager to redistribute 40 hours of their time to focus on larger strategic initiatives. Box is providing apprentices with key skills and development opportunities to support long-term growth and success, with 100% of apprentices on program feeling supported. As a recruiting executive at Box observes, “We have been able to take the necessary steps needed to drive a purposeful hiring plan and develop the talent needed for the future of our organization, while offering an amazing opportunity for apprentices to gain valuable skills and have access to development opportunities.”

## VII. The large mid-career workforce is well-suited to upskilling through apprenticeship

In considering ways to support the largest single group of workers who stand to gain the most via apprenticeships – those 68 million mid-careers workers currently facing barriers to advancement – we set out to identify upskilling avenues within existing occupations in addition to transitions into new roles, emphasizing the skill enhancements required to transition from junior roles to senior positions. Rather than requiring the daunting task of changing occupations, employers and workers in this situation can additionally pursue a strategy of upskilling.

A first step was to identify the skills differences between junior and senior level jobs, and to do so

across a broad selection of occupations. The chart below details the top set of skills which can bridge the gap between a junior and a senior position in six widely varying occupations.

Each of these target jobs offers a big pay differential for the workers who close these skills differences. The emphasis for these workers will be to stay in the same occupation while advancing, and gaining new skills that lead to greater job responsibilities and higher pay. Pathways to higher pay are not only those involving tech: indeed, a wide range of these roles are insulated from many of the exponential technologies reshaping work today.

### Top skill gaps between low- and high-wage workers in occupation

*Top same-occupation skill differences between junior and senior jobs*



## VIII. Apprenticeships leverage talent and advance equity

The 60 million workers who are most affected by churn, low or stagnant wages, the paper ceiling, and underemployment have something important in common. They are disproportionately women, Black, and Hispanic. In contrast, in many of the target occupations for apprenticeship pathways, these are the very groups of people who are vastly underrepresented.

The good news is that apprenticeships are the perfect response to this equity challenge. By its nature, apprenticeship expansion will draw on talent from a racially diverse pool with many women in it, and it will often direct workers toward occupations and roles with historically less racial and gender diversity. Successful implementations of such apprenticeships will result in increased diversity, equity, and inclusion in both the target occupations and the employers. As an example, Multiverse's employers partners – a wide range of companies across multiple sectors – are currently employing a cohort of apprentices that is more than 80% people of color; nearly half identify as Black.<sup>6</sup> Globally, about half of all Multiverse apprentices come from economically marginalized communities.

Some occupations are especially good targets for expansion: software developers, as an example, are an occupation where increased diversity is a big opportunity. Today the field is disproportionately white and male, with few Black, Hispanic, or women workers. Apprenticeships could have a sweeping impact in other occupations as well. Approximately 40% of high-churn, low-wage workers are Black or Hispanic. When those workers transition to other, higher-paying occupations, they will almost always be further diversifying that target occupation. As a mechanism for affecting such transitions, apprenticeship is a uniquely powerful channel for fulfilling equity imperatives so long as it draws representative populations from among these source pools of talent.

Companies and partners who engage in apprenticeship expansion work can craft policies that advance equity through deliberate practices. By partnering with community organizations and implementing effective apprentice marketing strategies, employers can foster a more diverse and inclusive culture and build a more effective talent ecosystem, both within the company, and with their peer employers.

## IX. Every organization has a role to play

For employers and business coalitions, educational institutions, policymakers, advocates, and other interested parties, we recommend these action steps to support the rapid scaling of apprenticeships in the US.

### Individual employers and employer consortia and associations can:

- Treat incumbent workers as an underutilized asset, and support them to upskill within their current jobs. Sometimes the talent you have can be the talent you need, if you build on workers' existing skills through an apprenticeship or other training.
- Identify and lift up hidden talent. Workers in low-wage, high-churn jobs have many talents that are routinely ignored or missed through normal hiring – talents that often align well with jobs for which employers have significant talent shortages. Partnerships with schools, colleges, and community institutions can be effective facilitators of talent identification and engagement.
- Remove degree barriers within companies and organizations, and seek the elimination of the paper ceiling within those occupations and industries.
- Place a higher value on skill development and demonstration than on pedigree. In the hiring process, focus on the skills a worker will need to have in order to start and thrive in an apprenticeship, not the skills they will need to do the job once they have been fully trained. Recognize potential and hire those who have it. Emphasize the value of skills acquired through apprenticeship and on-the-job training.

- Embrace the power of apprenticeships to attract, develop, and retain talent while simultaneously increasing the racial and gender diversity of occupations and entire organizations. Work closely with educators, community partners, and other resource organizations to develop effective apprenticeship programming that can achieve both goals.

### Educators and the leaders of educational institutions can:

- Embrace apprenticeships – or at very least, applied learning on the job – as a core educational tool for the success of students. Work with students, employers, and workers to ensure that classes and courses of study facilitate participation in apprenticeships, and make them easy for students to participate in.
- Incorporate apprenticeships into undergraduate, graduate, and certificate programming.
- Develop certification and degree-granting programming that uses apprenticeships as capstone or culminating features of study, and that smooths transition for students as they end their academic training and apply their new skills on the job.
- Work closely with employers and local business roundtables and private industry councils to build up local support for employers seeing to implement apprenticeship programs.

### Policymakers can:

- Learn from countries whose apprenticeship models are working well and involving many workers. Draw on the significant success of national investment in apprenticeships in the UK. Support the development of similar US policies.

- Increase funding for the expansion of apprenticeships in the US. Develop ways for US Department of Labor and American Reconstruction Act funding to underwrite apprenticeship programming and pathways. Support the passage of the bipartisan National Apprenticeship Act of 2023: if passed it would invest more than \$3.85 billion over five years to increase access to nearly 1 million new apprenticeship opportunities. Alternatively, consider models like the UK's Apprenticeship Levy which incorporate employer investment.
- Support changes in the use of Pell Grant funding to expand eligibility to students who are engaging in apprenticeships. Currently, students working in an apprenticeship that is connected to a student's program of study may or may not be eligible for Pell grant funding. Seek increases

in such Pell-funded access to apprenticeships so that all workers – and not just degree-earning students – can benefit.

- Strategically promote apprenticeship pathways as part of the critical workforce development needed to support the technological ambitions within CHIPS initiatives. Seek out target occupations which are compatible with both CHIPS and the apprenticeship-ready criteria articulated in this report.
- Create incentives for employers, industries, and regional and sectoral coalitions to promote the identification and opening of apprenticeship pathways across sectors and occupations.

**All interested parties** can collaborate with others in the co-development of an apprenticeship ecosystem, both nationally and locally.

## X. Conclusion

Apprenticeships increase opportunity. They offer employers a means to fundamentally transform their workforce and address the skills gaps and shortages of key talent that prevail across sectors.

The scale of possibility and the potential impact are large. Apprenticeships could mature to 830,000 per year, and potentially higher, with an impact of over \$28 billion in added wages for workers often stuck in low-wage roles.

There is a long road ahead. This analysis shows that in 2022 there were just 50,000 apprenticeships located in those jobs that are growing fast enough, and well-paying enough, to meet the criteria of this study. This is a drop in the bucket, when contrasted with the demand from 60 million workers needing reskilling opportunities and another 68 million potential upskillers.

The challenge for the future, therefore, is to grow apprenticeship programs, funding, and systems so that apprenticeships can take their place as a driver of a transformed US labor market – one that is highly skilled and increasingly equitable. This vision addresses many of the core workforce issues that employers face. It has the power to lift up workers nationwide.

The timing could not be more critical. Most American adults in the workforce, and over three quarters of BIPOC workers, are making their way in the workforce without bachelor's degrees.

Meanwhile, student loans hang over millions of workers, college campuses risk becoming less diverse due the overturning of affirmative action by the Supreme Court, and campuses are losing students at a record rate.

Apprenticeships can fuel the skill diversity of occupations and employers, and close skill gaps. Talent can be onboarded more rapidly, higher skill levels can increase productivity and improve results, dropped bachelor's degree requirements can allow for accelerated on-the-job learning and an influx of new or newly trained workers.

The large-scale expansion of apprenticeships holds out the promise of increased inclusion of women and Black and Hispanic workers, as well as workers living in economically marginalized communities. Through apprenticeships, these workers can bring their wealth of talents to bear in jobs that pay well and offer prospects for advancement and mobility.

Through a greater embrace of apprenticeships across the US workforce, all those involved have an opportunity to lift up marginalized workers, fill employers' critical talent needs, and build the workforce necessary to fuel the US economy's growth toward a future where every worker is empowered, and every skill is harnessed.



## Endnotes

- 1 In order not to count any worker more than once, the second, third, and fourth group totals count only those workers who have not appeared in a previous group.
- 2 Includes analysis derived from Frey and Osborne’s study, “The future of employment: How susceptible are jobs to computerisation?”
- 3 See “The Emerging Degree Reset” a Burning Glass Institute paper documenting the steady but gradual decline of jobs requiring a bachelor’s degree in the US.
- 4 See “The power of on-the-job learning” a Multiverse survey of global business leaders asking how businesses view the value of on-the-job learning.
- 5 There are a total of 1007 occupations in the modified O\*NET-SOC occupational taxonomy used to classify jobs; excluding military and post-secondary teaching occupations brings the total number of considered occupations to 956. Occupations are tested against the criteria to be an apprenticeship-ready occupation using data derived from the Bureau of Labor Statistics’ Occupational Employment and Wage Statistics (OES) and Occupational Outlook Handbook (OOH) data sets in addition to Lightcast job postings data.
- 6 See Multiverse’s Diversity, Equity, and Inclusion Page: <https://www.multiverse.io/en-US/diversity>

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