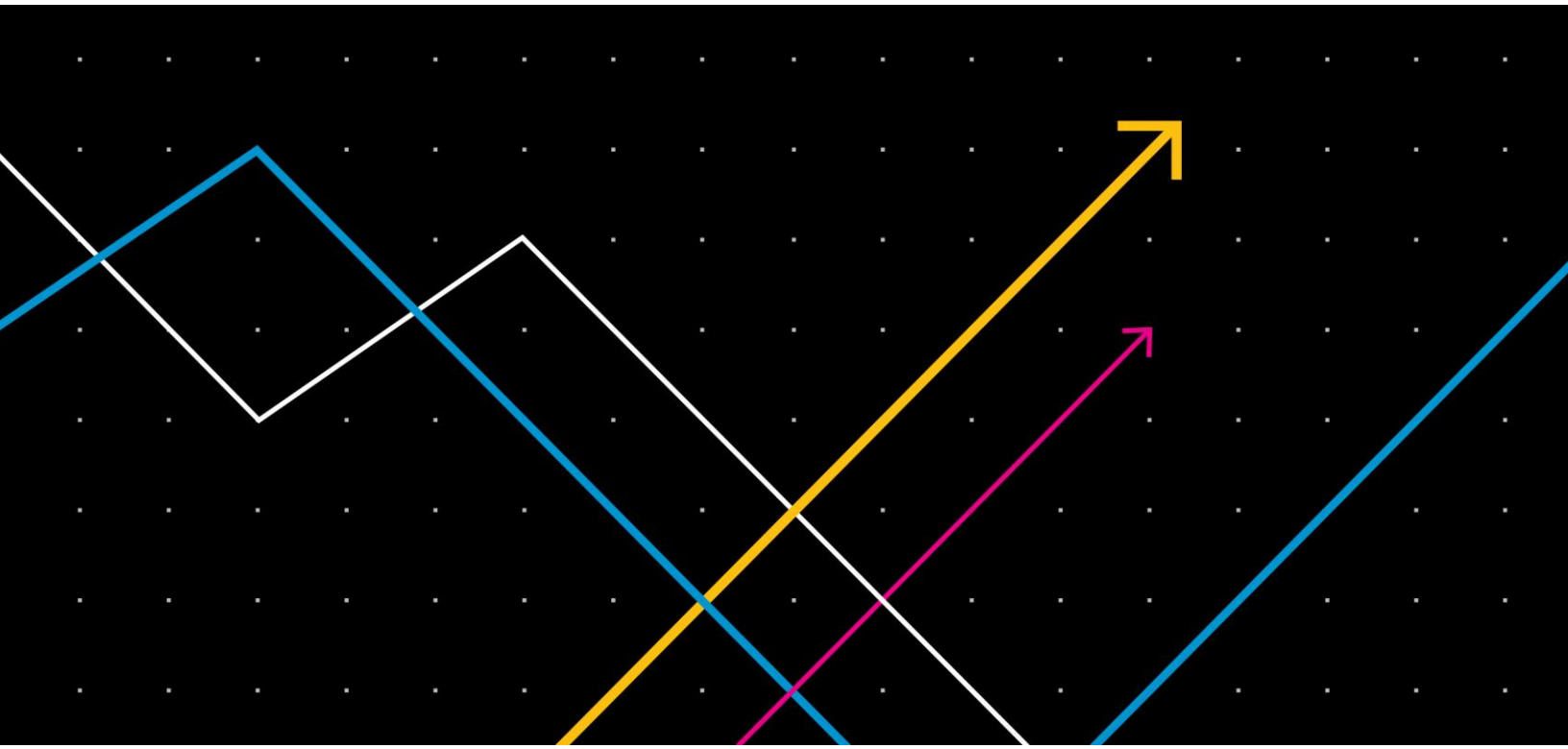

RESEARCH REPORT

A Review of the Literature on Registered Apprenticeships

Evaluating Registered Apprenticeship Initiatives

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Glossary

AAI	American Apprenticeship Initiative
ABA	Apprenticeship Building America
AWPAB	American Workforce Policy Advisory Board
CEO	Chief Evaluation Office, U.S. Department of Labor
CTE	Career and technical education
DEI	Diversity, equity, and inclusion
DOL	U.S. Department of Labor
IT	Information technology
OA	Office of Apprenticeship, U.S. Department of Labor
OJL	On-the-job learning
RAP	Registered Apprenticeship program
RAPIDS	Registered Apprenticeship Partners Information Database System
RTI	Related technical instruction
SAA	State apprenticeship agency
SAE	State Apprenticeship Expansion
WANTO	Women in Alternative and Nontraditional Occupations
WIOA	Workforce Innovation and Opportunity Act
YARG	Youth Apprenticeship Readiness Grant

Executive Summary

The U.S. Department of Labor's (DOL's) Chief Evaluation Office (CEO), in collaboration with DOL's Employment and Training Administration, contracted with the Urban Institute and its partners Mathematica and Social Policy Research Associates to conduct the Evaluating Registered Apprenticeship Initiatives project with a goal of understanding the implementation of recent investments in apprenticeship sponsored by DOL through the Apprenticeship Building America (ABA) grants. Through the project, CEO is interested in building evidence on efforts to expand and diversify Registered Apprenticeship programs (RAPs) in order to inform policymakers and practitioners on how the ABA grants are being used to help solve issues in workforce systems, particularly with regard to barriers to employment for traditionally underrepresented populations such as women, youth, individuals with disabilities, veterans, and people of color.

This report reviews the latest studies, reports, and documents on RAPs to help understand gaps in apprenticeship knowledge and to inform implementation studies of the ABA grants. The report discusses what we know about the benefits of apprenticeship for employers, workers, and society; how the federal government has been investing in the apprenticeship system; and what we have learned from state efforts to expand apprenticeship. The report also reviews the evidence for what specific types of RAPs work and for whom, although those findings are less clear. Finally, the report discusses what is known about the effectiveness of program models and strategies, and potentially promising practices.

Research on the Benefits of Apprenticeship

Prior research has found evidence on the benefits of Registered Apprenticeship to employers, workers, and society.

Benefits to employers. Employers are generally responsible for supervising, mentoring, and paying the wages and benefits of apprentices. Survey and interview data reveal that employer respondents find apprenticeship programs to be valuable and perceive the benefits to outweigh the costs, but few employers collect enough cost and benefit data to measure a return on investment (ApprenticeshipNC 2021; Helper et al. 2016; Lerman, Eyster, and Chambers 2009). There are several studies, however, providing evidence of the returns of apprenticeship programs for employers (Community Attributes 2018; Helper et al. 2016; Kuehn, Mills De La Rosa et al. 2022; Marotta et al. 2022). Those returns can include both direct benefits, such as reduced costs of hiring, and indirect benefits, such as improved company culture and employee loyalty.

Benefits to workers. Research has also documented benefits to workers participating in apprenticeship programs in the form of higher earnings (Fersterer, Pischke, and Winter-Ebmer 2008; Hollenbeck and Huang 2016; Jacoby and Haskins 2020; Katz et al. 2022; Reed et al. 2012; Walton, Gardiner, and Barnow 2022).

Benefits to society. Research also suggests net benefits accrue to the public from apprenticeship (Bruno and Manzo 2016; Hollenbeck and Huang 2016; Manzo, Manzo, and Bruno 2019; Reed et al. 2012)—that is, the benefits to individuals and society in the form of higher earnings and productivity for workers and lower use of public assistance programs outweigh the cost the government and other entities bear to administer programs.

Federal and State Efforts to Expand Apprenticeship

DOL has invested in efforts to promote apprenticeship as a promising strategy to both advance workers' skills and meet employers' need for a skilled workforce by granting significant funds to state workforce agencies and intermediaries, distributing more than $1 billion in apprenticeship grants between 2015 and 2022. State apprenticeship agencies have received those grants as well as invested their own resources in expanding their apprenticeship systems. In addition, states have implemented policies—such as employer tax credits and other employer incentives—to encourage apprenticeship expansion (Sattar et al. 2020). Studies of state efforts to expand apprenticeship have suggested some key factors in success, although the findings may not be broadly applicable to all states:

- State leadership is key to expanding quality apprenticeship at the state level.
- States value and use partnerships with other state agencies and intermediaries to both expand apprenticeship and integrate it with other state-level goals.
- Many states fund incentives to encourage employers and educational institutions to engage in apprenticeships, often in the form of tax credits or exemptions.
- Diversity among registered apprentices has not improved significantly since 2015 but is a high priority for states.
- States see Workforce Innovation and Opportunity Act (WIOA) programs as key partners but see WIOA staff expertise in apprenticeship as an area for improvement.
- States are also using legislation to encourage apprenticeship expansion.

The federal government and states are also prioritizing the expansion of apprenticeship into industries that do not traditionally have many apprenticeship programs, including manufacturing, health care, biotechnology, and information technology. Studies (Copson et al. 2021; Messina and Dvorkin 2019) have illuminated some obstacles to such efforts, including apprenticeship regulations that conflict with industry norms, a long approval process for new occupations, preconceptions among employers about which industries have apprenticeship, and rapid changes in technology.

Research on Apprenticeship Models and Strategies

Building the pipeline of apprentices. Our review found no research that measured the efficacy of strategies to increase enrollment into apprenticeship. However, studies suggest that partnering with a WIOA agency could support recruitment—colleges in particular have shown success with recruitment efforts (Gardiner et al. 2021)—and that supportive services might be associated with greater apprenticeship completion (Kelly et al. 2022; Kelly, Wilkinson, and Nuñez 2019). The evidence on pre-apprenticeship programs and their association with apprenticeship enrollment is mixed, although there was some association with other outcomes including employment, earnings, and skill level (Walton, Gardiner, and Barnow 2022). There are also indications that youth apprenticeship could be positively associated with earnings gains, maintaining career pathways, and high school graduation.

Strategies to improve diversity, equity, and inclusion (DEI) in apprenticeship. Evidence of strategies that improve DEI in apprenticeships is scarce. Findings from correlational studies suggest apprenticeship participation could be related to higher earnings growth for women and apprentices of color (Walton and Gardiner 2022), as well as to employment in nontraditional occupations for women (Mastracci 2005). Studies have also shown higher pre-apprenticeship participation for female apprentices (Kelly, Wilkinson, and Nuñez 2019; Walton, Gardiner, and Barnow 2022).

Partners in apprenticeship programs. There is limited research on the effectiveness of intermediaries in expanding apprenticeship or on the relative effectiveness of multiemployer models or joint programs (i.e., those sponsored jointly by a labor organization and one or more employers). Correlational studies suggest that multiemployer models may have greater benefits than single-employer models (Kuehn, Mills De La Rosa et al. 2022; Marotta et al. 2022) and that joint programs have higher completion rates than nonjoint (i.e., nonunion) programs (Berik, Bilginsoy, and Williams 2011; Bilginsoy 2003; Bilginsoy et al. 2022; Glover and Bilginsoy 2005; Kuehn 2019b). Employers are also key partners in apprenticeship programs, and a recent study showed that direct staff outreach could improve the likelihood of employer registration of programs (Trutko et al. 2022).

Strengthening the Apprenticeship System

Recent efforts to expand apprenticeship have illuminated where the Registered Apprenticeship infrastructure could be strengthened to support a growing system. Although there is no rigorous research on effective strategies, studies describe the challenges and potentially promising solutions. These include improving the apprenticeship registration process by leveraging technology (Elliott et al. 2022), intermediaries (Collins 2019; Lerman and Kuehn 2020), and employer incentives (McCarthy and Parton 2017); improving the tracking and accountability for youth and unregistered apprenticeships (Advance CTE 2019; 2020); and using technology-based learning in apprenticeship programs (Wolff, Koller, and van Docto 2020) with an awareness of the potential challenges in technical capabilities of staff and internet access for rural apprentices (Boren et al. 2021; Draeger 2021).

Key Takeaways and Knowledge Gaps

Despite recent evidence of the positive effects of apprenticeship, many questions remain about whether benefits are consistent across industries, employers, workers, and program models. Additionally, there is little rigorous evidence regarding the impact of pre-apprenticeship and youth apprenticeship programs, programs developed through community colleges and other intermediaries, and effective strategies to increase diversity among apprentices. DOL has funded research studies, including the ABA evaluation, that will build evidence on some of these aspects of apprenticeship, and more information will be available in the next few years as those studies release findings.

Introduction

The U.S. Department of Labor (DOL) awarded the Apprenticeship Building America (ABA) grants in 2022, investing $171 million to fund 39 grantees with a focus on equity and partnerships as well as pre-apprenticeship activities. The ABA grants advance DOL's efforts "to expand, diversify and modernize Registered Apprenticeship by increasing the number of programs and apprentices, diversifying the industries that use the 'earn-as-you-learn' model[1] for workforce development, and improving the access and performance of Registered Apprenticeship programs (RAPs) in underrepresented and underserved communities."[2] The awards ranged from approximately $2 million to $8 million over a 48-month grant period. Funding was awarded in four categories:

1. State apprenticeship system building and modernization
2. Expansion of RAP opportunities for youth
3. Ensuring equitable RAP pathways through pre-apprenticeship leading to RAP enrollment and equity partnerships
4. Registered Apprenticeship hubs to facilitate the establishment, scaling, and expansion of RAPs

Overview of the report. The DOL Chief Evaluation Office (CEO), in collaboration with DOL's Employment and Training Administration, contracted with the Urban Institute and its partners Mathematica and Social Policy Research Associates to conduct the Evaluating Registered Apprenticeship Initiatives project with a goal of understanding the implementation of the recent investments in apprenticeship sponsored by DOL. Through the project, CEO is interested in building evidence on efforts to expand and diversify RAPs to inform policymakers and practitioners on how the ABA grants are being used to help solve issues in workforce systems, particularly regarding barriers to employment for traditionally underrepresented populations.[3] The project includes three separate implementation studies: one each for category 1, categories 2 and 3, and category 4.

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[1] "Earn While You Learn Today," U.S. Department of Labor, accessed May 16, 2023, https://www.apprenticeship.gov/sites/default/files/dol-industry-factsheet-careerseeker-v10.pdf.

[2] "U.S. Department of Labor Awards $50M in Additional Grants to Fund Registered Apprenticeship Hubs to Expand Apprenticeships," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/newsroom/releases/eta/eta20220824.

Traditionally underrepresented populations include women, people of color, and people with disabilities. Traditionally underserved communities include veterans, formerly incarcerated people, and youth. See FOA-ETA-22-06 Apprenticeship Building America (ABA) Grant Program, U.S. Department of Labor, accessed May 16, 2023. https://www.grants.gov/web/grants/view-opportunity.html?oppId=336694.

[3] Notice of Availability of Funds and Funding Opportunity Announcement for: Apprenticeship Building America (ABA) Grant Program," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/sites/dolgov/files/ETA/grants/pdfs/ABA_FOA-ETA-22-06.pdf.

The project also includes (1) an impact and cost–benefit evaluability assessment of pre-apprenticeship programs that lead to RAPs, and (2) coordination across CEO and others' portfolio of Registered Apprenticeship projects to facilitate the sharing of findings, methods, and learning.

This report reviews the latest studies, reports, and documents on RAPs to help understand gaps in apprenticeship knowledge and to inform implementation studies of the ABA grants. It begins by providing background information on apprenticeship, then describes the key levers in the Registered Apprenticeship system, examines various cross-cutting topics, and discusses strengthening the apprenticeship infrastructure.

Methods. The review began with four literature scans written for the Apprenticeship Evidence-Building Portfolio. They include internal work product scans on (1) DOL investments in the apprenticeship system to inform the evaluations of the Scaling Apprenticeship and Closing the Skills Gap grants (Kuehn 2019a); (2) state apprenticeship systems to inform the State Apprenticeship Systems study (Harrington et al. 2022); (3) youth apprenticeship to support the evaluation of the Youth Apprenticeship Readiness grants (Kuehn, Payne et al. 2022); and (4) women in apprenticeship to support the descriptive study of the Women in Alternative and Nontraditional Occupations grants (Butrica, Kuehn, and Sirois 2023). We supplemented findings reported in these scans with additional studies identified using TDNet, WorkforceGPS, CLEAR, and Google Scholar. With a few exceptions, we included only studies completed between 2010 and 2022 and excluded international studies.

What Is Apprenticeship?

The middle class in America is believed to be increasingly losing ground because middle-skill career opportunities are becoming harder to find (Lerman 2016) while the costs of higher education needed for higher-skill careers continue to rise (National Center for Education Statistics 2022). At the same time, 87 percent of employers expect to face skills gaps within the next five years (Agrawal et al. 2020). Apprenticeships, which combine on-the-job learning with related instruction, can potentially help bridge the skills gap for workers and create positive returns for both workers and employers (Kuehn 2019a; Lerman 2016).

Types of Apprenticeship Programs

This report makes important distinctions between different types of apprenticeship training models and uses the following definitions:

- A **Registered Apprenticeship** meets federal and state standards and is registered with DOL or with a DOL-approved state apprenticeship agency (SAA). Both the DOL Office of Apprenticeship (OA) and SAAs register programs after approving their standards. DOL or an SAA may periodically inspect the program to ensure that it follows apprenticeship standards and all health, safety, and equal employment opportunity regulations. Apprenticeships may follow either a time-based, competency-based, or hybrid approach (see box 1).[4, 5] For an apprenticeship to be registered, the following elements must be included (Gardiner et al. 2021):

    1. at least 144 hours of related technical instruction (RTI) in a classroom
    2. at least 2,000 hours of on-the-job learning (OJL) monitored by a job-site mentor
    3. wages that increase over the course of the apprenticeship—either based on time or skill development
    4. an industry-recognized credential awarded after completing the apprenticeship
    5. a Standards of Apprenticeship document that includes the work process schedule and the RTI, OJL, and wage structure for the program
    6. a sponsor that oversees the program (see box 2 for examples of types of sponsors)

[4] "Registered Apprenticeship Program," U.S. Department of Labor, accessed January 20, 2023, https://www.apprenticeship.gov/employers/registered-apprenticeship-program.

[5] For Registered Apprenticeship, standards are presented in a document that specifies the details of the on-the-job learning, related training instruction, wage progression as a part of the work-based experience, and credentials to be awarded. DOL or an SAA then approves the document for the program to be considered "registered."

7. a written apprenticeship agreement between the apprentice and program sponsor or apprenticeship committee

- An **unregistered** apprenticeship program is a model that uses a similar earn-and-learn model as a Registered Apprenticeship but does not go through the same registration process or DOL review process for apprenticeship standards. Unregistered apprenticeships can include a wide variety of approaches for upskilling an employee with occupation-specific training. Occupational skills training programs could be considered unregistered apprenticeship programs if they include some combination of classroom and wage-paying on-the-job learning.
- A **pre-apprenticeship** program is designed to prepare individuals for entry into an apprenticeship program or, in some cases, into other related job opportunities. It may last anywhere from a few weeks to a few months and may or may not include a paid, work-based experience. Pre-apprenticeship programs have varied components; however, at the core, they intend to place an individual on a pathway to employability that often includes an apprenticeship program.

Box 1. General Approaches to Completing Apprenticeship Training

DOL establishes three general approaches that RAPs can use:

- A **time-based approach** requires apprentices to complete a minimum of 2,000 on-the-job learning hours. This approach requires programs to outline the amount of time apprentices will train in specific work processes for each occupation.
- A **competency-based approach** requires apprentices to demonstrate specific skills and knowledge as defined and evaluated by the sponsor. Apprentices must still complete on-the-job learning.
- A **hybrid approach** requires apprentices to demonstrate competency as described in a competency-based approach while specifying a range of hours of on-the-job learning required for each work process. This approach still requires a minimum of 2,000 hours of on-the-job learning.

Source: U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship, "Guidelines for Competency-Based, Hybrid, and Time-Based Apprenticeship Training Approaches," Employment and Training Administration Circular 2016-01, October 20, 2015, Washington, DC.

Box 2. Types of Apprenticeship Sponsors

Apprenticeship programs can vary according to type of sponsor:

- **Employer:** A single employer can function as an independent program sponsor by designing, registering, and administering a program independently. A consortium of businesses can also serve in the sponsor role.
- **Intermediary:** An intermediary can also serve as the sponsor of a program. Intermediaries can be an industry association, workforce development board, community college, or other community-based organization.
- **Labor organization, or union:** A labor organization can also jointly sponsor an apprenticeship program with an employer. In these cases, the program must meet the standards of the union rather than being unilaterally designed by an employer.

Source: Benjamin Collins, *Registered Apprenticeship: Federal Role and Recent Federal Efforts*, Report R45171 (Washington, DC: Congressional Research Service, 2019); "What Is an Apprenticeship Program Sponsor?," US Department of Labor, accessed December 13, 2022; Frank Manzo and Robert Bruno, *The Apprenticeship Alternative* (La Grange, IL: Illinois Economic Policy Institute, 2020).

RAPs do not automatically receive federal funding; however, when apprenticeship programs are registered, they automatically become eligible for federal workforce development funds through the Workforce Innovation and Opportunity Act (WIOA) (Collins 2019). All the apprenticeship programs funded through the ABA grants are RAPs. Researchers estimate that only about half of apprentices participate in RAPs; the rest participate in programs that are not registered with OA or an SAA (Jacoby and Lerman 2019).

Research on the Benefits of Apprenticeship

Prior research has found evidence on the benefits of Registered Apprenticeship to employers, workers, and society.

Benefits to employers. Employers are generally responsible for supervising, mentoring, and paying the wages and benefits of apprentices. Surveys and interviews with employers reveal that they find apprenticeship programs to be valuable and perceive the benefits to outweigh the costs, but few employers collect enough cost and benefit data to measure a return on investment (ApprenticeshipNC 2021; Helper et al. 2016; Lerman, Eyster, and Chambers 2009). There are, however, several studies providing evidence of the returns of apprenticeship programs for employers (Community Attributes 2018; Helper et al. 2016; Kuehn, Mills De La Rosa et al. 2022; Marotta et al. 2022). Those returns can include direct benefits, such as reduced costs of hiring, but also indirect benefits, such as improved company culture and employee loyalty.

- Even using a conservative valuation method, an evaluation of the American Apprenticeship Initiative (AAI) grants found that 38 percent of employers recouped their apprenticeship investments when accounting for only direct benefits. This increased to 66 percent when accounting for both direct and indirect benefits.[6] Moreover, the median return on investment, including both direct and indirect benefits, was $1.44 for every dollar invested (Kuehn, Mills De La Rosa et al. 2022). Findings from a survey of the same employers indicated that employers most often cited improved company culture as an indirect benefit of apprenticeships, followed by improvements in talent pipelines and increased employee loyalty (Marotta et al. 2022).
- Analyzing the production and cost data of two companies using the difference-in-differences statistical method, researchers found that the apprenticeship programs nearly paid for themselves within the first year and had internal rates of return of at least 40 and 50 percent. The apprenticeship programs also increased productivity and reduced burnout and turnover (Helper et al. 2016).
- Community Attributes (2018) collected cost–benefit data from employers of apprentices in Oregon and found that electrician apprenticeships created a net benefit for employers of $150,000 per apprentice over four years. Information technology (IT) apprenticeship returns on investment ranged from a net cost of $13,800 to a net benefit of $56,200 for one year.

Benefits to workers. Research has also documented benefits to workers participating in apprenticeship programs through higher earnings.

- An evaluation of AAI grantees found that five quarters after their expected apprenticeship end date, the average AAI apprentice saw their earnings grow by $17,500, or 50 percent over their earnings before the apprenticeship (Walton, Gardiner, and Barnow 2022). Moreover, the quarterly earnings of AAI apprentices grew 27 percentage points faster than the earnings of comparable workers[7] by the 10th quarter after their apprenticeship started (Katz et al. 2022).
- Hollenbeck and Huang (2016) found a lifetime net benefit of participating in a RAP in Washington State to be $338,560 per apprentice, with $87,198 of that benefit accumulating within a year and a half of program completion.
- A study of participants in the Kentucky Federation for Advanced Manufacturing Education (KY FAME) found that they were earning roughly $45,000 more after five years than similar Kentucky community and technical college students who were not enrolled in KY FAME (Jacoby and Haskins 2020).[8]

[6] Direct benefits were measured as the value of apprentices' productivity. Indirect benefits were measured as the benefits the employer experienced from the apprenticeship program beyond the increased productive output from the apprentice.

[7] Comparable workers were defined as those with earnings records in the U.S. Census Bureau's Quarterly Workforce Indicators data who had the same sex, race, ethnicity, age, education level, and state of residence as AAI apprentices.

[8] The comparison group of non–KY FAME students was constructed by pair-matching with KY FAME students based on being a full-time student in the Kentucky Community and Technical College System associate degree program, identically enrolled or not enrolled during their first year in a program or developmental course designed to compensate for an academic shortcoming, and in the same local workforce area. In addition, matching pairs were approximately the same age, awarded approximately the same Pell Grant amount in the first year of enrollment, and in the same academic class of freshman or sophomore.

- A study of apprenticeship in 10 states found a statistically significant $6,595 annual earnings gain for apprentices within six years of completing a RAP; this was used in estimating a lifetime gain of $98,718 in earnings and $25,187 in benefits (Reed et al. 2012).
- A 2008 quasi-experimental study using employment records from the Austrian Social Security Administration and controlling for unobserved worker characteristics revealed a statistically significant 4 percent wage gain per year of apprenticeship training (Fersterer, Pischke, and Winter-Ebmer 2008).

Benefits to society. Research also suggests that the public receives net benefits from apprenticeship.

- The aforementioned study of apprenticeship in 10 states also found an average net social benefit of $58,888 in the medium term (nine years after enrollment) and $124,057 over a lifetime (36 years; Reed et al. 2012). Net social benefits were calculated by measuring the difference between potential benefits (worker earnings, higher worker productivity, reduced use of government benefits programs) and costs (for federal, state, and local agencies or parties administering programs).
- Hollenbeck and Huang (2016) found a $126,023 lifetime net benefit per registered apprentice for the public. The net benefit was calculated by estimating the increase in tax receipts from the increase in earnings of apprentices and subtracting unemployment insurance benefits paid, the costs of training services, and taxes forgone while in training.
- Researchers in Illinois and Minnesota used a model of economic impacts to estimate $3.00 in social benefits (or state gross domestic product [GDP]) for every dollar spent on apprenticeship training. Their model connected the investment in Registered Apprenticeship in the construction industry to the creation of jobs, support of existing industry jobs, and an increase in consumer demand, and hence to an increase in the state economy and the state's GDP (Bruno and Manzo 2016; Manzo, Manzo, and Bruno 2019).

Efforts to Expand Registered Apprenticeship

DOL has invested in efforts to promote apprenticeship as a promising strategy to both advance workers' skills and meet employers' need for a skilled workforce by granting significant funds to state workforce agencies and intermediaries, including the most recent ABA grants totaling $171 million.[9] States also invest their own resources in expanding their apprenticeship systems. In addition, states implement policies to encourage apprenticeship expansion, such as employer tax credits and other employer incentives (Sattar et al. 2020).

Federal Investments

DOL distributed more than $1 billion in apprenticeship grants between 2015 and 2022. Some key examples:

- In 2015, DOL invested in the AAI grant program to expand Registered Apprenticeship into IT and other high-growth industries including but not limited to advanced manufacturing, business services, and health care and with populations traditionally underrepresented in apprenticeship programs. In total, AAI awarded $175 million in five-year grants to 46 grantees across the country (Gardiner et al. 2021).[10, 11]
- In 2016, DOL awarded $100 million in State Apprenticeship Expansion (SAE) grants to 36 states and one territory to support state efforts to expand apprenticeship to existing and new industries, such as IT, health care, advanced manufacturing, cybersecurity, and business services, as well as to increase efforts to attract a more diverse and inclusive population of apprentices.[12] These grants were followed by several rounds of state grants in subsequent years including the Apprenticeship State Expansion grants and the Building State Capacity for Apprenticeship grants (Harrington et al. 2022; Sattar et al. 2020).

[9] "U.S. Department of Labor Awards $50M in Additional Grants to Fund Registered Apprenticeship Hubs to Expand Apprenticeships," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/newsroom/releases/eta/eta20220824/.

[10] "American Apprenticeship Initiative," U.S. Department of Labor, accessed May 16, 2023, https://www.apprenticeship.gov/investments-tax-credits-and-tuition-support/american-apprenticeship-initiative.

[11] One grant ended prior to the start of data collection for the evaluation so the evaluation findings are for 45 grantees (Gardiner et al. 2021).

[12] "State Apprenticeship Expansion," U.S. Department of Labor, accessed May 16, 2023, https://www.apprenticeship.gov/investments-tax-credits-and-tuition-support/state-apprenticeship-expansion.

- In 2019, DOL awarded $184 million in grants through the Scaling Apprenticeship through Sector-Based Strategies program for public–private partnerships in the advanced manufacturing, health care, and IT industries.[13] In 2020, DOL awarded nearly $100 million in grants through the Apprenticeship: Closing the Skills Gap program, which targets expansion in the same industries.[14] The grant programs include both registered and unregistered apprenticeship, and pre-apprenticeship.
- In 2020, DOL awarded $42 million in Youth Apprenticeship Readiness grants (Kuehn, Payne et al. 2022).
- DOL has awarded Women in Alternative and Nontraditional Occupations (WANTO) grants since 1994, including $3.4 million in 2022, to expand access and support for women in apprenticeships.[15]

State Expansion Efforts

Four state apprenticeship system scans offer insight into how states are approaching expansion of their apprenticeship systems (Hauge and Parton 2016; Rosenberg and Dunn 2020; Sattar et al. 2020; "States as Drivers of Registered Apprenticeship Expansion" 2021).[16] Key findings from those studies include these:

- **State leadership is believed to be an important element of expanding quality apprenticeship at the state level**. Researchers recommend that governors create and communicate a consistent vision for high-quality, work-based learning that aligns state agencies and partners and implements supportive funding and policies to expand apprenticeship (Hauge and Parton 2016; "States as Drivers of Registered Apprenticeship Expansion" 2021). State governments supplied support to 28 SAE grantees including appropriated funding, supportive legislation, executive orders, statewide apprenticeship initiatives, and stakeholder convenings (Sattar et al. 2020).

[13] "U.S. Department of Labor Makes Major Announcements on Apprenticeship Expansion," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/newsroom/releases/eta/eta20190624.

[14] "U.S. Department of Labor Announces Nearly $100 Million in Apprenticeship Grants to Close the Skills Gap," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/newsroom/releases/eta/eta20200218/.

[15] "WANTO Grant Program," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/wb/grants/wanto.

[16] An evaluation of the SAE grant program used interviews with state apprenticeship administrators and a review of secondary documents to understand grant implementation (Sattar et al. 2020). As part of the same study, Rosenberg and Dunn (2020) surveyed state agencies to explore their experiences with apprenticeship expansion, key challenges, priorities, supportive policies, and funding. Hauge and Parton (2016) reported findings from a National Governors Association roundtable of researchers and experts as well as findings from six state participants in a National Governors Association work-based learning initiative. The American Institutes for Research summarized lessons learned through technical assistance work with SAE grantees ("States as Drivers of Registered Apprenticeship Expansion" 2021).

- **States reported that they value and use partnerships with other state agencies and intermediaries to expand and integrate apprenticeship with other state-level goals.** Researchers recommend state agencies partner with intermediaries to increase capacity and to align apprenticeship with state postsecondary attainment goals and programs (Hauge and Parton 2016; "States as Drivers of Registered Apprenticeship Expansion" 2021). When surveyed, states named increasing the number of intermediary sponsors as a top priority (ranked fourth out of 11 priorities on average across 49 states; Rosenberg and Dunn 2020). Most SAE grantees leveraged partnerships with other state agencies to expand apprenticeships. Common partners included departments of education, departments of commerce, postsecondary schools or systems, state and local workforce boards, and industry leaders (Sattar et al. 2020).
- **States offer financial incentives to employers to encourage apprenticeship.** States fund incentives to encourage employers and educational institutions to engage in apprenticeships, often in the form of tax credits or exemptions (Hauge and Parton 2016; Rosenberg and Dunn 2020; Sattar et al. 2020). Financial incentives are more common in states with an SAA than in states where OA registers programs (Rosenberg and Dunn 2020). Funding RTI as an incentive was more common than offering wage subsidies among SAE grantees (29 states versus 4 states). Though agencies view employer incentives as important, three states said they wanted to encourage some employer investment (through wages), which they saw as critical to successful apprenticeship programming (Sattar et al. 2020).
- **Diversity among registered apprentices has not improved significantly since 2015 but is a high priority for states.** Neither racial, gender, nor age diversity improved at the national level in RAPs between 2015 and 2019 according to analysis of OA's Registered Apprenticeship Partners Information Database System (RAPIDS) data (Harrington et al. 2022). However, 13 states that received SAE grants identified increasing diversity as a key goal, and indeed SAE-sponsored apprentices in 2019 were more diverse than all registered apprentices in RAPIDS in 2016 (Sattar et al. 2020). The National Governors Association panel sees expanding youth apprenticeship as a key strategy to increase diversity for the future (Hauge and Parton 2016). Other strategies suggested in the literature for improving diversity among apprentices include changing perceptions of apprenticeship, simplifying application processes, creating pre-apprenticeship programs, partnering with organizations that serve underrepresented groups, and providing wraparound supportive services to address barriers to participation (Sattar et al. 2020; "States as Drivers of Registered Apprenticeship Expansion" 2021). See the section **Diversity, Equity, and Inclusion in Apprenticeship** later in this report for further discussion.
- **States reported that they see WIOA programs as key partners but see WIOA expertise in apprenticeship as an area for improvement.** Thirty-one states reported that they linked Registered Apprenticeship with existing WIOA programs by collaborating with local workforce development boards and American Job Center business services staff to increase interest in apprenticeship, fund individual training accounts, and make RAPs eligible training providers. However, three state administrators shared that staff in the public workforce system often lacked the specialized expertise needed to promote apprenticeship effectively (Sattar et al. 2020).

States are also using legislation to encourage apprenticeship expansion. Thirty states passed 60 apprenticeship laws between 2016 and 2018, about half of which established new apprenticeship programs or created new requirements for existing programs (Hentze, Cesario, and Canada 2019). The other half had a variety of purposes: targeting specific demographics; using pay incentives to encourage stakeholders (e.g., students, employers, educational institutions) to participate; using tax incentives to encourage employers to host apprentices; and integrating apprenticeship efforts with the state's

workforce development and realignment efforts. At the state level, 494 bills related to apprenticeship passed in 2020 that aimed to align educational and training systems to meet market demand and expand apprenticeship pathways (Hentze and Herman 2021). For example, New Jersey passed a suite of bills creating task forces and providing supportive services to diversify apprenticeships so that they are more inclusive of underrepresented populations and people with disabilities (Draeger 2021).

Even with the recent increase in public funding and support, when compared with other countries, apprenticeship participation in the U.S. is limited. In Germany and Switzerland, apprenticeship is a fully integrated career pathway that typically begins in late high school. As many as 70 percent of youth in Switzerland, Austria, and Germany begin their careers as apprentices, continuing to either employment or postsecondary education opportunities (Lerman 2014; Singmaster 2015). In 2021, Registered Apprentices accounted for only 0.38 percent of the total employed civilian population in the U.S.[17] There may be various reasons why apprenticeship is less prevalent in the U.S. than in other countries. For example, Lerman, Kuehn, and Shakesprere (2019) suggest that the U.S.'s focus on postsecondary degree attainment and standardized testing has led to a relative neglect of vocational training and apprenticeship.

Nonetheless, the number of apprentices in the U.S. is increasing. By one estimate, the number of new apprentices increased by 90 percent between 2008 and 2019 (Haimson and Sattar 2021). By 2021, according to DOL, more than 593,000 apprentices participated in nearly 27,000 RAPs.[18]

Expanding into Nontraditional Industries and Occupations

In the U.S., the construction industry has the most registered apprentices—accounting for 36 percent of all active apprentices in 2021.[19] Electricians constitute by far the most common occupation among active registered apprentices (13.1 percent), followed by carpenters (5.4 percent) and plumbers (4 percent; all three occupations are part of the construction industry).[20] The National Governors Association panel recommended that states take advantage of strategic opportunities to expand apprenticeship, including expanding into STEM-intensive[21] industries (Hauge and Parton 2016). When state apprenticeship administrators were asked to rank several items in order of their perceived priority for their apprenticeship system, expanding apprenticeship in nontraditional industries or

[17] Authors' calculations. The U.S. Bureau of Labor Statistics estimated the seasonally adjusted civilian employed population to be 156,081,000 in December of 2021. DOL's Apprenticeship.gov estimates there were 593,690 active apprentices in 2021.

[18] "Registered Apprenticeship National Results Fiscal Year 2021 10/01/2020 to 9/30/2021," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2021.

[19] "Interactive Apprenticeship Data: Apprentices by State Workload," U.S. Department of Labor, accessed December 13, 2022, https://www.apprenticeship.gov/data-and-statistics.

[20] "Registered Apprenticeship National Results Fiscal Year 2021 10/01/2020 to 9/30/2021," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2021.

[21] STEM is an acronym commonly used to refer to the fields of science, technology, engineering, and mathematics.

occupations (industries that traditionally do not have RAPs) was the top priority for 18 percent of states and the second priority for 30 percent of states (Rosenberg and Dunn 2020). The U.S. is making efforts to expand the number and type of apprenticeship occupations as can be seen in federal efforts to support the expansion of apprenticeship into nontraditional industries and occupations such as the SAE grants to states. The most common priority among SAE grantees was to expand into nontraditional industries, including manufacturing, health care, biotechnology, and IT (Sattar et al. 2020). However, research on what strategies are most effective at expanding apprenticeship into nontraditional industries is scarce.

Existing literature provides qualitative information about what challenges exist and what strategies may be important for expanding apprenticeship to nontraditional industries and occupations. Challenges include the following:

- **Existing laws that govern apprenticeship may not be suitable for new industries**. Apprenticeship registration is a major hurdle for many tech employers in New York because of the complexities of registering programs with the New York State Department of Labor (Messina and Dvorkin 2019). RAPs are prohibited by law from modifying their curricula within two years of launch, which would prevent prospective tech employers from helping programs stay up to date with rapidly changing technology. An AAI grantee reported that national credentialing standards used by Wisconsin's technical colleges made it difficult to introduce health care apprenticeships partly because of the incompatibility of apprenticeship standards with credentialing standards (Copson et al. 2021). The grantee circumvented the problem by working with University of Wisconsin Health to develop a medical assistant apprenticeship program that instead met the accreditation standards of the National Healthcareer Association.
- **Rapid changes in technology make it difficult to establish uniform industry standards for the skills apprentices need to learn**. According to Copson and colleagues (2021), by the time an IT program is developed and registered, and apprentices complete it, the skills the RTI and OJL teach might no longer be relevant. Therefore, the work process schedules need to allow the flexibility for RTI and OJL to be updated to align with the most recent technology.

Potential strategies for facilitating expansion into nontraditional industries include these:

- **Fitting the occupation within the constructs of existing DOL-approved occupations could simplify the approval process**. DOL requires feedback from multiple stakeholders on the necessary RTI and OJL components of a new occupation. Instead, AAI grantee staff found ways to fit its focal occupations within those already approved (Copson et al. 2021).
- **Target decisionmakers and connect them to employers who have experienced apprenticeship**. According to staff from AAI grantees, employers in nontraditional industries often associate apprenticeships with the construction trades (Copson et al. 2021). It takes multiple contacts to locate the ultimate decisionmaker at the employer and then upwards of a year to launch its apprenticeship program. Grantee staff addressed these challenges by hiring sales staff with multiple employer contacts and by holding recruitment events where attendees could engage with employers who had already hired apprentices. Overall, 76 percent of AAI apprentices enrolled in nontraditional occupations—ranging from 92 percent of women apprentices to 59 percent of Hispanic apprentices (Walton, Gardiner, and Barnow 2022).

Building the Pipeline of Apprentices

One key objective of the recent ABA grants as well as other federal and state investments in apprenticeship (see Efforts to Expand Registered Apprenticeship in this report) is the development of a diverse pipeline of apprentices, which includes increasing the access to and inclusivity of apprenticeship programs. While this review found no rigorous research on strategies to increase enrollment in apprenticeship, some studies suggest that certain characteristics and strategies might be important for recruiting apprentices.

Gardiner et al. (2021) described the experiences of AAI grantees with regard to recruiting apprentices. Of the grantees that met their apprentice recruitment targets, 80 percent partnered with a WIOA-administering agency, 60 percent partnered with a state and sub-state government, 53 percent partnered with an economic development agency, and 50 percent had experience developing a RAP. Across the different types of grantees, grantees that were colleges were most likely to have attained or exceeded their apprentice recruitment targets (60 percent). Although not necessarily associated with their relative success, different from most other grantees, a large percentage of colleges provided supportive services (77 percent) and a small percentage recruited and screened apprenticeship candidates (20 percent). As with most other grantee types, employers were the most common partner among colleges, and 83 percent of employers, overall, were partners that assisted in the intake, screening, and recruiting of apprentices.

Although this review identified no studies that considered the role of supportive services in recruiting apprentices, studies have shown that supportive services may be promising in increasing apprenticeship completion. Kelly, Wilkinson, and Nuñez (2019) analyzed Oregon Apprenticeship System data and found that receiving social supportive services had a positive effect, even larger than the effect of financial supportive services, on the odds of apprentices completing their program.[22] Additionally, Kelly et al. (2022) analyzed data on construction apprentices and found that supportive services were positively associated with apprenticeship completion.[23] In the rest of this section, we discuss the research on two other approaches to building the pipeline of apprentices: the development of pre-apprenticeship programs and youth apprenticeship programs.

[22] Survey respondents were asked, "What kinds of ongoing support have you received from your pre-apprenticeship program?" The authors grouped responses into social supportive services and financial supportive services.

[23] Supportive services included nonfinancial services (such as a budget class, mentoring, and referrals to other services), job readiness supplies (such as work tools, work clothing, and personal protective equipment for first-year apprentices), travel assistance (gas, hotel, and food), and child care subsidies.

Pre-Apprenticeship Programs

As defined earlier, pre-apprenticeship programs seek to prepare candidates to enter a RAP, are typically shorter than apprenticeships, and may (or may not) offer paid work experience (Collins 2019; Harrington et al. 2022). Pre-apprenticeship programs aim to improve interest in and preparation for apprenticeship, especially for young apprentices, and recruitment of diverse candidates (Gaal 2018; Kelly, Wilkinson, and Nuñez 2019; Lerman and Kuehn 2020; Steva 2017; Wallace 2018; Walton, Gardiner, and Barnow 2022; Worthen and Haynes 2009).

OA does not register pre-apprenticeship programs but recommends that high-quality programs contain the following six elements:[24]

- an approved training program and curriculum
- expanded opportunities for underrepresented individuals to enter Registered Apprenticeship
- access to support services
- promotion of Registered Apprenticeship in general
- hands-on training that does not displace current workers
- a smooth transition to a Registered Apprenticeship for graduates

Federal initiatives have focused on pre-apprenticeship programs and found success in recruiting a diverse pipeline of potential apprentices. For example, about 75 percent of the 45 AAI grantees funded a pre-apprenticeship program to help meet the initiative's goal to expand apprenticeship to nontraditional areas and underrepresented populations. Almost all AAI pre-apprentices (90 percent) were individuals from underrepresented populations, such as women, people of color, veterans, and people with disabilities, and had less formal education and lower earnings than AAI apprentices (Walton, Gardiner, and Barnow 2022). Among AAI grantees, the most common pre-apprenticeship occupations were construction, manufacturing, and health care. The average AAI pre-apprenticeship program lasted three months, including 180 hours of work-based training. Two-thirds of grantees provided some type of financial support to pre-apprentices, and some grantees offered career and academic supports as well (Walton, Gardiner, and Barnow 2022).

YouthBuild, which began as a Department of Housing and Urban Development program in 1992 and moved to DOL in 2006, is designated by WIOA as a pre-apprenticeship program model. YouthBuild grantees receive DOL funding to operate pre-apprenticeships for opportunity youth—individuals between the ages of 16 and 24 not connected to school or work.[25] YouthBuild programs offer training in construction, with the goal of connecting graduates with Registered Apprenticeships, and range in length from 6 to 32 weeks. They pair comprehensive case management with strong partnerships among

[24] "What is a Pre-Apprenticeship Program?" U.S. Department of Labor, accessed May 16, 2023, https://www.apprenticeship.gov/employers/explore-pre-apprenticeship.

[25] "YouthBuild USA," YouthBuild USA, accessed December 13, 2022, https://youthbuild.org/.

apprenticeship providers to help smooth the transition to apprenticeship for graduates (YouthBuild USA 2015).

Correlation of participation in pre-apprenticeship with enrollment in apprenticeship. The limited research available presents mixed results on pre-apprenticeship programs' association with pre-apprentices' selection into Registered Apprenticeship. A longitudinal study of two pre-apprenticeship construction programs found that though program completion rates were high (76 and 87 percent), only a quarter of participants entered a Registered Apprenticeship within a year and a half of program completion (Kelly, Wilkinson, and Nuñez 2019). A 2009 survey of 236 pre-apprenticeship programs in the construction field similarly found high completion rates, but most enrolled fewer than 50 percent of graduates in RAPs, and more than a third of programs placed less than 25 percent of graduates in RAPs (Conway, Gerber, and Helmer 2010).

In contrast, an evaluation of the 45 AAI grantees' pre-apprenticeship programs revealed high rates of entry into Registered Apprenticeship. Sixty-three percent of those who completed a pre-apprenticeship program entered a RAP, with even higher rates of Registered Apprenticeship entry among health care and construction pre-apprentices (Walton, Gardiner, and Barnow 2022).

Dorsett and Stokes (2022) used administrative data to evaluate the effects of traineeships in England, programs similar to pre-apprenticeships in the U.S. They found that participation in traineeships increased the chances of enrolling in an apprenticeship for 16-to–18-year-old pre-apprentices, but not for older pre-apprentices.

There is no evidence on what aspects of a pre-apprenticeship program facilitate entry into apprenticeship. Conway and Gerber (2009) noted that some program sponsors reported higher RAP placement rates than others, but the authors did not identify particular characteristics of the more successful sponsors.

Pre-apprenticeship programs can work toward a variety of outcomes, including RAP placement but also job or postsecondary education placement (Helmer, Blair, and Gerber 2012). Of the AAI pre-apprentices who completed their program, 23 percent took a job in related employment, 7 percent went on to pursue other education, and 6 percent took a job in unrelated employment (Walton, Gardiner, and Barnow 2022). Apprenticeship may not be a good fit for all pre-apprentices, and therefore reporting on a wider range of performance measures other than just apprenticeship placement may help programs better measure success (Conway and Gerber 2009; Helmer, Blair, and Gerber 2012).

Correlation of participation in pre-apprenticeship with other outcomes. Some research exists on other outcomes for pre-apprenticeships, including employment and earnings. Among AAI pre-apprentices, 83 percent were employed by the end of pre-apprenticeship programs—an increase of 20 percentage points from the year prior to starting the pre-apprenticeship program. Pre-apprentices also saw annual earnings nearly double after completing programs—due at least in part to the increase in employment. Pre-apprentices under age 24 saw the largest employment and earnings increases (26 percentage points and 167 percent, respectively) (Walton, Gardiner, and Barnow 2022). Dorsett and

Stokes (2022) found that traineeships in the United Kingdom had no significant effects on employment. Perceptions of strengths in 14 skill areas improved for participants in a U.S. construction pre-apprenticeship after the program (Kelly, Wilkinson, and Nuñez 2019).

Qualitative research offers some practices that could inform the assessment of pre-apprenticeship programs under the ABA grants (table 1).

TABLE 1

Practices from the Literature on Pre-Apprenticeships

Element	Practices
Designing training and curriculum programming	▪ Sponsors should consider the needs of the populations they train, employers they serve, and job opportunities in the area when designing programs (Conway, Gerber, and Helmer 2010). ▪ Pre-apprenticeship training and assessment should be developed in partnership with sponsors and include experiences that mimic industry conditions and specific benchmarks for participants (YouthBuild USA 2015). ▪ Curricula should prepare a diverse set of pre-apprentices to enter Registered Apprenticeship by using plain language, supporting English language acquisition, helping pre-apprentices earn educational credentials, addressing soft skills, and including industry awareness (Tieszen et al. 2020).
Giving access to supportive services	▪ A comparison of two construction pre-apprenticeship programs found that the weekly stipend that participants received in only one of the two programs may have improved Registered Apprenticeship placement (Worthen and Haynes 2009). ▪ YouthBuild programs can offer strong case management for pre-apprentices including support obtaining a driver's license and arranging child care. YouthBuild Spokane uses AmeriCorps education awards as a resource to pay for tuition and tools (YouthBuild USA 2015).
Creating a smooth transition to Registered Apprenticeship	▪ YouthBuild recommends strong case management and partnership with workforce development agencies, industry groups, and apprenticeship coordinator committees (YouthBuild USA 2015). ▪ Pre-apprenticeship programs could support entry into either Registered Apprenticeship or other quality postsecondary opportunities including dual-enrollment programs. Programs could create agreements for direct entry into two-year or four-year educational institutions (Tieszen et al. 2020). ▪ Pre-apprenticeship is believed to help employers and workers determine whether apprenticeship is a good fit (Helmer, Blair, and Gerber 2012; Worthen and Haynes 2009; YouthBuild USA 2015).

Youth Apprenticeships

While no single definition exists for youth apprenticeship programs, youth apprenticeship is often defined as an apprenticeship program for participants ages 16 to 24.[26] Such programs usually, but not exclusively, take place in a secondary school or community college[27] and can be unregistered or, as in the case of Youth Apprenticeship Readiness Grant (YARG) grantees, registered. Payne and Kuehn (2023) describe five youth apprenticeship models observed among YARG grantees: secondary school–based registered apprenticeship models, postsecondary school–based registered apprenticeship models, intermediary models, regionally coordinated registered apprenticeship models, and youth-supporting mixed-age registered apprenticeship models. Importantly, youth apprenticeship programs allow youth to choose college, employment, or both after completion. They are not just an alternative to traditional educational pathways but an "options multiplier" because they provide direct entry into a career pathway and also open the door to further postsecondary study (Fuller et al. 2022).

Many young people face obstacles when transitioning to work, as indicated by a December 2022 youth unemployment rate of 9.1 percent for those ages 16 to 19 compared with 6.6 percent for those ages 20 to 24 and 2.7 percent for those ages 25 to 64.[28] This is occurring as middle-skills jobs require more credentials and college costs continue to rise (Adams, Hahn, and Coffey 2021; Scott, Shakesprere, and Porter 2020). Youth have high disconnection rates; in 2017, 5 million youth were neither enrolled in school nor employed in the workforce (Sack and Allen 2019; Wolff, Koller, and van Docto 2020). While many young people enter college, only two-thirds of those who enter obtain a degree within six years.[29] Low-income, Black, and Hispanic students are much less likely to graduate than their counterparts.[30, 31]

[26] "What Do We Mean by Youth Apprenticeship?" U.S. Department of Labor, accessed May 16, 2023, https://www.apprenticeship.gov/educators/youth-apprenticeship.

[27] "Youth Apprenticeship," U.S. Department of Labor, accessed December 13, 2022, https://www.apprenticeship.gov/educators/youth-apprenticeship.

[28] "Current Population Survey (Household Data): Unemployment Rate by Age and Sex, Monthly, Not Seasonally Adjusted," Federal Reserve Bank of St. Louis, accessed December 13, 2022, https://fred.stlouisfed.org/release/tables?rid=50&eid=48595.

[29] "Fast Facts: Undergraduate Graduation Rates," National Center for Education Statistics, accessed December 13, 2022, https://nces.ed.gov/FastFacts/display.asp?id=40.

[30] "Graduation Rates by Family Income," Midwestern Higher Education Compact, accessed December 13, 2022, https://www.mhec.org/dashboard/graduation-rates-family-income.

[31] "Graduation Rates by Race/Ethnicity," Midwestern Higher Education Compact, accessed December 13, 2022, https://www.mhec.org/dashboard/graduation-rates-raceethnicity.

Youth apprenticeship has the potential to reduce youth unemployment and close skills gaps while leaving completers with little or no debt (Fuller and Sigelman 2017; Lerman and Packer 2015; Parton 2017). However, some apprenticeship sponsors have voiced concerns about developing youth apprentices, including a lack of interest among youth (Arabandi, Boren, and Campbell 2021; Lerman 2016; Steva 2017) and challenges in recruiting, preparing, and retaining youth in apprenticeships (Steva 2017; Sullivan et al. n.d.; Tiezsen et al. 2020).

Although youth apprenticeship in the U.S. lags that of European countries like Switzerland, Austria, and Germany (Lerman 2014), interest in them has grown in the past decade. In those three countries, 55 to 75 percent of youth take part in apprenticeship programs, most beginning in early secondary school (Lerman 2014). In contrast, the U.S. has fewer than 600,000 active apprentices and only 37 percent of them are under the age of 25.[32] However, the number of American youth entering Registered Apprenticeships has been increasing and more than doubled between 2010 and 2020—from 18,877 to 40,293 (Sullivan et al. n.d.).

High schools are often youth apprenticeship partners. School staff coordinate with multiple participating employers and recruit and provide guidance to students interested in apprenticeship (Lerman, Kuehn, and Shakesprere 2019). Schools are also well positioned to maintain contact with apprentices' parents and to ensure continued parental support for the program (Standafer 2019). Recognizing this, as of 2019, Colorado, Virginia, and Oklahoma state laws required that public high schools take certain steps to ensure that students and parents are regularly informed about apprenticeship opportunities (National Conference of State Legislatures 2019). Local colleges are often an additional partner in youth apprenticeship programs that either utilize dual enrollment[33] or use colleges for related instruction (Monthey 2019). Other partners might provide supportive services such as transportation, housing, child care, food assistance, or appropriate work clothing (Kuehn 2021).

In addition to DOL's investment in youth apprenticeship through the YARG grants, the U.S. Department of Education as well as state and local education agencies have recently renewed interest in career and technical education (CTE)[34] and youth apprenticeship as a supplement to CTE (Katz and Elliott 2020; Kreamer et al. 2017; Lerman, Kuehn, and Shakesprere 2019; U.S. Department of Education 2021). States like Colorado, Georgia, Kentucky, Maryland, and North Carolina and private foundations such as the Richard M. Fairbanks Foundation have also invested in youth apprenticeship (Baddour and Hauge 2020; Fiddian-Green 2020; Lerman, Kuehn, and Shakesprere 2019).

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[32] "Registered Apprenticeship National Results Fiscal Year 2021 10/01/2020 to 9/30/2021," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2021.

[33] Dual-enrollment programs enable high school students to complete high school requirements while earning college credits. See "Dual or Concurrent Enrollment in Public Schools in the United States," National Center for Education Statistics, accessed February 26, 2023, https://nces.ed.gov/pubs2020/2020125/index.asp.

[34] The Department of Education defines CTE as high school courses and postsecondary programs that focus on the skills and knowledge required for specific jobs or fields of work. See "About CTE Statistics," National Center for Education Statistics, accessed February 26, 2023, https://nces.ed.gov/surveys/ctes/about.asp.

Correlation of participation in youth apprenticeship with earnings and other outcomes. Rigorous evidence on the benefits of youth apprenticeship is sparse, in part because many youth apprenticeship programs are not registered and hence not tracked by DOL, and because programs vary substantially from state to state (Kuehn, Payne et al. 2022).

Descriptive studies on youth apprenticeship or other workforce programs have indicated some positive outcomes:

- According to one study, the average hourly wage for a student exiting a RAP was $31, compared with a little less than $13 for youth overall (Sullivan et al. n.d.). The largest absolute and percentage differences in wages for apprentices and wages for youth overall were highest for Hispanic ($32 versus $12) and male youth ($31 versus $13) (Sullivan et al. n.d.).
- A study of Wisconsin's Youth Apprenticeship program found that a higher share of student apprentices continued in their chosen career pathway after high school than students who did not participate in apprenticeship (Mindham and Schultz 2019).
- Another study provided some evidence that students who enrolled in CTE as juniors and seniors were statistically significantly less likely to drop out of high school and more likely to graduate on time than students who did not participate in CTE (Gottfried and Plasman 2017).

Evidence on work-based learning suggests potential positive outcomes from youth apprenticeship programs. Studies find that youth participation in formal work-based mentoring, a standard component of apprenticeship programs (Gardiner et al. 2021), is associated with a higher grade point average, better attendance, stronger beliefs that school is relevant to work, and higher perceptions of college readiness and skills development (Linnehan 2001, 2003; Theodos et al. 2017). Shandra and Hogan (2008) analyzed data from the National Longitudinal Study of Youth and found that internships and work-based mentoring were the only work-based initiatives positively associated with post–high school work outcomes—students who took part in an internship earned higher wages and those who took part in work-based mentoring had more fringe benefits on their future jobs.

Case studies and qualitative literature suggest that youth apprenticeship programs face a few barriers to being successful as a workforce development strategy. One of the challenges is a prevailing preference for traditional four-year degrees over other alternative paths. Focus groups with high school parents, students, and recent graduates in 2017 revealed that while parents and youth value apprenticeship, college was their preferred choice (Parton 2017). Parents favor apprenticeship as a postsecondary option for their child as opposed to their child starting a job, but still prefer college (Sterrett et al. 2020). Table 2 presents these and other challenges described in the literature and strategies suggested to address them, which could inform youth apprenticeship programs under the ABA grants.

TABLE 2

Challenges and Potential Strategies from the Literature on Youth Apprenticeships

Challenge	Strategies
Recruiting and retaining participants	▪ Selective apprenticeship programs that offer the opportunity to earn a degree, coordinated career pathways, and flexible on- and off-ramps that allow workers to the try different industries, occupations, and employers on their career pathway can help generate interest in apprenticeship among high school students (Arabandi, Boren, and Campbell 2021; Sack and Allen 2019). ▪ Pre-apprenticeship, work-based mentoring, and supportive services can help students prepare for and remain enrolled in apprenticeships (Hagler and Rhodes 2019; Hamilton, Boren, and Arabandi 2022; Sack and Allen 2019).
Serving special populations	▪ Two case studies offered the following recommendations for serving opportunity youth (those not in school or in the workforce): select youth-focused staff with attention to social-emotional development, create work-based learning progressions that allow for a range of experiences, and integrate case management and supportive services into the apprenticeship model (Browning and Sofer 2017). ▪ To address challenges for rural youths, such as travel distance to and from sites, lack of digital infrastructure, and lack of resources among small businesses, businesses can pool resources and sponsors can supply wireless access points and fund transportation (Boren et al. 2021).
Aligning apprenticeship with career and technical education	▪ Youth apprenticeship programs may benefit from using intermediary organizations, such as employers, nonprofit organizations, and community colleges, to coordinate between schools and employers because requirements for youth tend to be more complex (Education Strategy Group 2019; Gaal 2018; Kuehn 2021; Monthey 2019; Rice et al. 2016). See the section Types and Roles of Intermediaries later in this report for more information. ▪ In Iowa, schools sponsor youth apprenticeships, aligning career and technical education with standards for Registered Apprenticeship. Cooperation between state and federal government, between employers and schools, and with strong partner organizations has been key in increasing the number of secondary schools operating youth apprenticeship programs from 1 to 26 between 2018 and 2020 (Marotta, Boren, and San Miguel 2020). ▪ In Colorado, CareerWise, an intermediary, works to align school and apprenticeship strategies (see box 3) (Ginsburg 2022).

More rigorous research on outcomes and best practices in youth apprenticeship could inform the development of such programs. The Partnership to Advance Youth Apprenticeship named improved data collection as a key priority for youth apprenticeship (Advance CTE 2020). However, only 16 states collect data on youth apprenticeship and only 20 states even formally define youth apprenticeship (Advance CTE 2019). As with other areas of Registered Apprenticeship, improving research and data

collection could help inform a path forward. See the section Data and Performance Management Systems later in this report for more information.

Box 3. CareerWise Colorado

CareerWise, an apprenticeship intermediary founded in 2016 in Colorado, partners with industry and public school districts to build connections and help scale youth apprenticeship. Its model includes elements of the Swiss apprenticeship model, including heavy employer engagement, dual-track education, and coaching for youth. Apprenticeships typically last three years, beginning in high school. CareerWise offers apprenticeships in 16 occupations and seeks to reach 75 occupations across 10 industries by 2024. CareerWise has leveraged its success across Colorado to launch programs in Indiana, New York, and Washington, DC.

Source: Batia Katz and Diana Elliott, "CareerWise: Case Study of a Youth Apprenticeship Intermediary" (Washington, DC: Urban Institute, 2020).

Diversity, Equity, and Inclusion in Apprenticeship

The diversity of apprentices in the U.S. has improved little over time (Camardelle 2023; Hanks, McGrew, and Zessoules 2018; Sullivan et al. n.d.)—a trend that DOL is trying to address through various programs, including the ABA grants.[35] Between 1960 and 2021, for example, the share of apprentices who were Black increased only slightly from 3.3 to 9 percent (Camardelle 2023). Moreover, Black workers are underrepresented in apprenticeship—representing only 9 percent of apprentices but 12.3 percent of the workforce (Camardelle 2023). Although women make up nearly half of the labor force,[36] analysis of RAPIDS data reveals that they represented only 12.2 percent of active registered apprentices in 2021 (Butrica, Kuehn, and Sirois 2023). This is up from 8.1 percent in 2013, one of the few indications that diversity, equity, and inclusion (DEI) in apprenticeship is progressing. The incompleteness of RAPIDS data on race, ethnicity, disability, and veteran status complicates the tracking of overall DEI progress; 19 percent of active apprentices did not identify their race in 2021.[37]

Studies suggest that women are less likely to participate in apprenticeships and, once participating, face obstacles to achieving positive employment outcomes in terms of wages and earnings. One study reported that women in RAPs found lack of child care and cost of child care as major challenges for participation (Reed et al. 2012). Studies have also reported that women have been underrepresented in high-paying occupations and overrepresented in low-paying occupations (Gradín 2020; Nanda et al. 2018). An analysis of RAPIDS data found that just over a third of female apprentices were in predominantly female-dominated occupations in the health care, education, and personal care sectors. These occupations typically have lower hourly wages than traditional apprenticeship occupations such as construction and extraction and installation, maintenance, and repair, where only about 5 percent of apprentices are women (Butrica, Kuehn, and Sirois 2023). Even though wages are higher, women may be discouraged from working in these trades because of how they are treated. One study found that tradeswomen experienced unwelcomed sexual remarks 83 percent of the time, were not given proper training 54 percent of the time, and faced unfair layoff practices 44 percent of the time (LeBreton and Loevy 1992). In a recent survey of tradeswomen, 44 percent reported that they left or considered

[35] "U.S. Department of Labor Awards $50M in Additional Grants to Fund Registered Apprenticeship Hubs to Expand Apprenticeships," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/newsroom/releases/eta/eta20220824.

[36] Women represented 47 percent of the civilian labor force in 2021. See "Labor Force Statistics from the Current Population Survey: Employed Persons by Detailed Occupation, Sex, Race, and Hispanic or Latino Ethnicity," U.S. Bureau of Labor Statistics, accessed December 13, 2022, https://www.bls.gov/cps/cpsaat11.htm.

[37] "Registered Apprenticeship National Results Fiscal Year 2021, 10/01/2020 to 9/30/2021," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2021.

leaving the trades and more than half of these women cited harassment and lack of respect as their reason (Hegewisch and Mefferd 2021).

Federal and State Efforts to Increase DEI

DOL has been investing in efforts to increase DEI within the apprenticeship system, including helping states, intermediaries, training providers, and employers design apprenticeship programs with a diversity and inclusion lens and develop programs that are designed to improve access for specific populations. The following are some examples:

- One of two main goals of DOL's $175 million investment in the AAI grant program in 2015 was to increase Registered Apprenticeships among populations traditionally underrepresented in apprenticeship programs (Gardiner et al. 2021).
- A main goal of the SAE grants awarded in 2016 was to increase the diversity of the apprentice population. Sixty percent of participants enrolled as of the end of 2019 were nonwhite and 13 percent were female (Sattar et al. 2020). Subsequent grants to states have also included a focus on equity, including the State Apprenticeship Expansion, Equity, and Innovation grants in 2021.[38]
- DOL's Office of Disability Employment Policy funded the Partnership on Inclusive Apprenticeship in 2020 to expand and support apprenticeships for people with disabilities.[39] This initiative helps employers design apprenticeship programs with a DEI lens in demand-driven occupations.
- DOL awarded $1.9 million to fund Apprenticeship Inclusion Models demonstration projects to help scale apprenticeship programs that are accessible to youth and adults with disabilities.[40]
- DOL has awarded WANTO grants since 1994, including $3.4 million in 2022, to expand access and support for women in apprenticeships.[41]

State and local areas also provide incentives to improve DEI in apprenticeships. For example, in 2019, Missouri invested in a new pilot apprenticeship program for individuals with disabilities. The state was one of five states to receive training from DOL on how to increase apprentice diversity. In Utah, the Governor's Committee on Employment for People with Disabilities recognizes employers and individuals who promote equal employment opportunities for individuals with disabilities (Council of State Governments 2021).

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[38] "U.S. Department of Labor Announces Availability of $87.5M in Funding to States to Expand, Diversify Registered Apprenticeship Programs," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/newsroom/releases/eta/eta20210318-0.

[39] "Partnership on Inclusive Apprenticeship (PIA)," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/odep/program-areas/apprenticeship/pia.

[40] "Apprenticeship Inclusion Models," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/odep/program-areas/individuals/youth/inclusive-apprenticeship.

[41] "WANTO Grant Program," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/wb/grants/wanto.

Research on Strategies to Improve DEI in Apprenticeship

Rigorous evidence of strategies that improve DEI in apprenticeships is scarce. Some studies have shown promising results from analysis of participant outcomes for programs that include DEI components, including studies of AAI and WANTO grants.

- Findings from an evaluation of AAI found that 54 percent of AAI apprentices were from underrepresented populations compared with only 39 percent of apprentices in RAPIDS (Walton and Gardiner 2022). Women made up 25 percent of AAI apprentices and 9 percent of RAPIDS apprentices, and people of color made up 39 percent of AAI apprentices and 37 percent of RAPIDS apprentices. While all apprentices experienced increased earnings between the year prior to starting the apprenticeship and the year following its conclusion, averaging 49 percent, earnings growth was higher for women (65 percent) than men (43 percent) and for apprentices from other races[42] (86 percent) than for Black apprentices (37 percent), white apprentices (45 percent), and Hispanic apprentices (50 percent). Though the findings do not represent causal impacts of AAI, they are indicative of the potential benefits of apprenticeships for traditionally underrepresented populations.
- A study of the WANTO grants found that the grants increased the probability of women being employed in nontraditional occupations by 5 to 15 percent, depending on the model specification (Mastracci 2005).
- An analysis of South Carolina's apprenticeship expansion effort, which included heavy expansion into the retail and health care occupations that tend to employ more women, showed that expanding into industries that employ more women can improve the overall gender equity across apprenticeship programs (Kuehn 2017).

Pre-apprenticeship appears to be an important avenue into apprenticeship for women and other underrepresented groups. Kelly, Wilkinson, and Nuñez (2019) found that, according to the Oregon Apprenticeship System database, a higher proportion of white women (21.7 percent) and women of color (31.5 percent) participating in RAPs had completed a pre-apprenticeship program than men (2.1 percent of men of color and less than 1 percent of white men). Among AAI apprentices, entry into Registered Apprenticeship was more prevalent among women pre-apprentices (73 percent) than among men pre-apprentices (58 percent). The authors noted that a contributing factor was that more women than men were in health care pre-apprenticeships and the share of pre-apprentices who continued to a Registered Apprenticeship was very high in health care (Walton, Gardiner, and Barnow 2022). A review of pre-apprenticeship programs recommended that to engage underrepresented individuals equitably, pre-apprenticeship programs should identify barriers to participation when establishing program goals, ensure programs are high quality, use equitable recruitment strategies, limit barriers to enrollment, offer wraparound supportive services, and ensure fair compensation (Tieszen et al. 2020).

[42] "Other race" describes non-Hispanic apprentices who reported themselves as Asian, Native Hawaiian or Pacific Islander, Native American, or multiple races.

In 2016, DOL updated its equal employment opportunity regulations to provide guidelines for reaching a more diverse pool of apprentices.[43] Several studies have used qualitative data to identify promising practices for implementing apprenticeship programs that promote DEI. Table 3 provides suggestions from that literature for specific underrepresented groups as well as general practices that can support access for multiple populations.

[43] "Diversity, Equity, Inclusion, and Accessibility," U.S. Department of Labor, accessed December 13, 2022, https://www.apprenticeship.gov/employers/diversity-equity-inclusion-accessibility.

TABLE 3

Strategies to Improve Representation of Underrepresented Populations in Apprenticeships Recommended in Literature

Population	Practices
Women	▪ Educate employers and unions on creating a more supportive environment and culture on the job site for women to improve employee retention, particularly in nontraditional occupations (Butrica, Kuehn, and Sirois 2023). ▪ Offer women-only training programs that can provide a supportive and comfortable learning environment for obtaining occupational skills and professional development (Chuang 2019).
Individuals with disabilities	▪ Establish partnerships to coordinate and communicate across programs, which may be particularly important for serving youth with disabilities. For example, an intermediary can partner with an employer or a school district to support youth apprentices who receive Supplemental Security Income. The intermediary CareerWise facilitates employers' relationships with educational institutions that provide training, recruit apprentices, and mentor those who will work with apprentices (Kuehn 2021). ▪ Offer different types of learning, such as online-focused apprenticeship opportunities (Council of State Governments 2021). Apprenticeship programs can incorporate self-determination training to help apprentices with disabilities in setting their own goals and practicing self-advocacy (Kuehn et al. 2021). ▪ Offer employers technical assistance to provide specialized training to their employees and workplace personnel on accommodating individuals with disabilities (Kuehn et al. 2021).
English language learners	▪ Engage strategic partners to champion for English language learners to access apprenticeships that lead to in-demand skills and well-paid employment opportunities (Mollica 2020). ▪ Maintain close ties with employers and unions to identify suitable jobs (Mollica 2020). ▪ Discuss entry requirements that may systematically exclude immigrants (Mollica 2020).
Individuals in the justice system	▪ Think creatively about what occupations outside of prison could be adapted to programs in prison to expand prison-based apprenticeship opportunities (Hecker and Kuehn 2019). ▪ Raise wages in prison-based apprenticeships to increase completion rates (Hecker and Kuehn 2019). ▪ Reduce disruptive transfers of inmates to encourage continuity and increase completion rates. Transferring inmates from one facility to another creates disruptions as the new facility may not offer the same apprenticeship (Hecker and Kuehn 2019). ▪ Engage employers to ensure that apprenticeships are consistent with labor market needs, allowing individuals to continue their training through work-based experiences outside of prison through work release programs (Hecker and Kuehn 2019).

Population	Practices
Veterans	▪ Engage military career-transition personnel to assist in recruiting veterans. These organizations can also inform more inclusive marketing, such as increasing the diversity of representation in program flyers and brochures (Cheney 2019; Toglia 2020). ▪ Use virtual briefings to promote apprenticeship to transitioning service members in the period immediately before and even after transition (Spaulding et al. 2022).
General	▪ Work closely with nonprofits and other partners that serve underrepresented groups to promote relationships and trust between employers, recruiters, and communities of color, and increase diversity in the workforce (Johanson 2019; Toglia 2020). ▪ Promote pre-apprenticeship programs to provide additional support for individuals from underresourced communities, and create a pipeline and pathway model to apprenticeships in in-demand occupations (Cheney 2019; Johanson 2019; Mollica 2020). ▪ Provide mentorship to help apprentices advance in their careers, especially those from underresourced communities who may have limited access to social and career networks (Cheney 2019). This type of preparation may help workers retain employment and build supportive networks (Cheney 2019; Johanson 2019; Toglia 2020). ▪ Encourage employers sponsoring apprenticeship programs to promote DEI by creating a more inclusive workplace culture and reviewing internal hiring policies that might systematically exclude certain populations (Cheney 2019). In particular, employers can consider using competency-based criteria to select apprentices rather than traditional selection criteria, such as degree attainment (Cheney 2019; Toglia 2020). ▪ Provide wraparound supportive services to help traditionally underserved populations be successful in apprenticeship programs (Walton and Gardiner 2022). For example, the City of Buffalo, New York, provided employer shuttle buses, bus passes, and app-based trips to address limited access to jobs and training opportunities via public transit (Johanson 2019).

Partners in Apprenticeship Programs

The apprenticeship system consists of many partners that can play different roles depending on the program. Intermediaries are one such partner—they are a fixture in apprenticeship systems and have played a role in efforts to scale programs and reduce the burden on employers in starting programs. Unions are another such partner—they can sponsor apprenticeship programs, train apprentices, and refer individuals to apprenticeships, educational institutions that often provide training, and employers that hire apprentices. Below we discuss what is known about the role of such organizations in the apprenticeship system.

Types and Roles of Intermediaries

Intermediaries are organizations with expertise about the apprenticeship system that can reduce the burden of any single partner or organization in establishing and managing an apprenticeship to make apprenticeships more realizable as a workforce training model and to expand their presence across industries, occupations, and diverse workers (Katz and Elliott 2020). There is no rigorous research showing the relative benefits of intermediaries on apprenticeship expansion or apprenticeship outcomes. Below we summarize what can be gleaned from descriptive research about the types and roles of intermediaries in apprenticeship.

Sattar et al. (2020) noted that there is no single definition of an intermediary, but that they can be employers, nonprofit organizations, colleges, chambers of commerce, or other organizations that convene and connect industry, education, and community-based partners. In youth apprenticeships, intermediaries might also be secondary school systems, community colleges, nonprofit organizations, state agencies, or workforce development councils (Kuehn, Payne et al. 2022; U.S. Department of Education 2021). In state apprenticeship systems, states vary in the extent to which certain intermediaries are more prevalent. In a 2020 survey of state apprenticeship administrators, community college intermediaries were considered a major partner for apprenticeship in the highest number of states, followed closely by other state entities (such as state workforce boards), unions, and employer associations (Rosenberg and Dunn 2020). Other types of intermediaries, such as local workforce boards, school districts, and professional associations, were also considered major partners but in fewer states.

Elliott and Farnbauer (2021) described three types of intermediaries based on the roles they typically support: (1) those that are employer facing and specialize in providing business services to employer clients to help them with program implementation; (2) those that are apprentice facing and specialize in upskilling and training candidates and coaching them through the apprenticeship system; and (3) those that serve both employers and apprentices equally.

Thus, intermediaries can advise on, assist with, or assume sole responsibility for various apprenticeship-related functions. They can also serve different roles in different apprenticeship programs, such as sponsoring an apprenticeship, registering a program, program planning, program operations, and helping with paperwork for apprenticeship registration, employee records and pay, and data sharing agreements between institutions (Education Strategy Group 2019; Kuehn, Payne et al. 2022). They can research and document promising practices (Sullivan 2016), and they can identify and help apprentices access social services and supportive services such as child care, transportation, and academic supports more easily than employers, who are not typically as aware of apprentices' social service needs and options (Kuehn 2021). In youth apprenticeships, intermediaries might also be responsible for matching students and employers, recruiting students and employers, working with schools, managing relationships, covering liability, supervisor training, program planning, and helping employers identify appropriate tasks and skills-building for apprentices (Education Strategy Group 2019; Kuehn, Payne et al. 2022; Parton 2017). In state apprenticeship systems, intermediaries might also play an important role in identifying career pathways, assisting with program implementation, and collecting employer feedback on the performance of workers completing training (Sattar et al. 2020; Harrington et al. 2022).

Some industry intermediaries specialize in a particular industry. DOL currently funds 16 Registered Apprenticeship Industry Intermediaries that serve as apprenticeship intermediary organizations in an official capacity to provide technical assistance to Registered Apprenticeship stakeholders in specific industry sectors—currently, IT; health care and health care IT; advanced manufacturing; transportation, distribution, and logistics; supply chain (advanced manufacturing and automation); construction; hospitality; telecommunications; cybersecurity; and care economy.[44] In their descriptive study of 10 national industry intermediaries, Lerman and Kuehn (2020) reported that industry intermediaries provided pre-apprenticeship programs, engaged employers, and developed new occupational frameworks. They found that eight national industry intermediaries had substantially exceeded their targets for the number of apprentices registered and new apprenticeship programs developed.

Multiemployer Programs and Unions

RAP models differ depending on whether they are sponsored by only one employer (nongroup) or multiple employers (group) and whether they are sponsored together with a labor organization (joint) or without a labor organization (nonjoint; Kuehn, Hecker, and Simon 2019).[45] Although dated, the 2007 Survey of Sponsors of Registered Apprenticeship found that 40 percent of Registered Apprenticeship sponsors, especially in IT and construction programs, had multiple employers, and that 38 percent of

[44] Registered Apprenticeship Industry Intermediaries: Partners for Apprenticeship Success," U.S. Department of Labor, accessed December 13, 2022, https://www.apprenticeship.gov/sites/default/files/dol-industryfactsheet-ra-industryintermediaries-updated.pdf.

[45] Multiemployer programs are not necessarily sponsored by employers; they can be sponsored by an intermediary, such as a labor–management organization in the case of group joint programs.

those had union involvement (Lerman, Eyster, and Chambers 2009). Gardiner and colleagues (2021) noted that in the construction trades, unions generally have a role in Registered Apprenticeship through joint apprenticeship training committees. The committees administer the apprenticeship programs and comprise both labor and management representatives.[46]

Evidence on multiemployer models. This review found limited information on multiemployer models and their impact on apprenticeship programs and participant outcomes, but the existing literature suggests that multiemployer models have promise. Group joint and nonjoint apprenticeship programs had the highest median or net indirect benefits[47] in a recent evaluation, suggesting that group models may have better outcomes for apprentices than single-employer models (Kuehn, Mills De La Rosa et al. 2022; Marotta et al. 2022).

Lessons from other research. Descriptive studies provide some insights into why multiemployer models show promise as suggested above.

- These models can reduce the burden on individual employers to start apprenticeship programs and spread risk and cost across a wider range of employers (Rolland 2016). Multiemployer models can also expand apprenticeships to those that might not otherwise participate—including small employers and rural participants. The Washington Association of Community & Migrant Health Centers (now the Washington Association for Community Health), which created a multiemployer apprenticeship model with 27 federally qualified health centers located throughout the state, allowed rural and smaller employers to enroll one or two employees at a time,[48] increasing access to apprenticeships that might not otherwise have existed.
- Because of their broad reach, community and technical colleges as well as industry associations often have the ability to engage multiple employers as sponsors for one program (Sattar et al. 2020). For example, the Wireless Infrastructure Association served as an intermediary in expanding the industry's multiemployer apprenticeship model to meet employers' occupational and skills development needs through a contract from DOL in 2020.[49]

[46] Code of Federal Regulations, Title 29—Labor, accessed December 13, 2022, https://www.govinfo.gov/content/pkg/CFR-2019-title29-vol1/xml/CFR-2019-title29-vol1-sec29-2.xml.

[47] Indirect benefits were defined as nonmonetary benefits such improved company culture, improvements in the talent pipeline, and increased employee loyalty.

[48] "Rural Healthcare Providers Use Apprenticeship to Address Staffing Needs," National Fund for Workforce Solutions, accessed December 13, 2022, https://nationalfund.org/rural-healthcare-providers-use-apprenticeship-to-address-staffing-needs/.

[49] "DOL Awards WIA Funding to Develop 5G Workforce," Wireless Infrastructure Association, accessed December 13, 2022, https://wia.org/dol-awards-wia-funding-to-develop-5g-workforce/.

Evidence on joint programs (i.e., those sponsored jointly by a labor organization and one or more employers). Several studies have suggested that apprenticeship programs that include a union sponsor (joint) have higher completion rates than nonunion-sponsored programs (nonjoint). Three studies looked at the construction industry (Bilginsoy 2003; Biliginsoy et al. 2022; Glover and Bilginsoy 2005), while another study looked across industries (Berik, Bilginsoy, and Williams 2011). A fifth study of programs in the service industry found that joint programs with only one employer had higher completion rates relative to joint programs with multiple employers and nonjoint programs (Kuehn 2019b).

Training Providers

Training providers are key actors in the apprenticeship system, and the training they deliver is at the core of an apprenticeship program. The two components of training are OJL, which is delivered by employers on site, and RTI, which is delivered by training providers in various formats and venues. Our review found no rigorous research on how the type of training provider affects apprentice outcomes. Descriptive findings from the recent AAI evaluation reported by Gardiner and colleagues (2021) offer some information about training providers within apprenticeships:

- **Community colleges are common training providers**. In the AAI grants, RTI was most commonly delivered by community and technical colleges (57 percent), followed by employers in-house (39 percent) and private training providers (30 percent). Other less common training providers included unions and industry associations.
- **Training providers vary by occupation**. Local colleges provided RTI for 87 percent of manufacturing occupations and 70 percent of construction occupations, but only 46 percent of IT occupations and 46 percent of health occupations in the AAI grants. The authors hypothesized that the choice of whether to use colleges might depend on the strength of the local college in a particular technical area, the cost of college training compared with other types of classroom training, and the availability of noncollege options for classroom training.

Engaging Employers

Employer participation is required for all apprenticeship programs and is thus critical to their success (Trutko et al. 2022, Sattar et al. 2020). Employers can fund classroom RTI and OJL, and they can hire apprentices upon program completion. Their engagement can drive the design of an apprenticeship program (Sattar et al. 2020). Convincing employers to participate in apprenticeship, however, can be challenging because of the perceived costs of registering and establishing an apprenticeship program, as well as the costs to monitor and maintain a program. In a 2020 survey of state apprenticeship administrators, three of the four top major barriers (out of 14 listed barriers) to expanding Registered Apprenticeships were related to employer engagement (Rosenberg and Dunn 2020). In the AAI study, the concerns expressed by employers included, among others, time to mentor and train apprentices, costs, fear of apprentices being poached upon program completion, and the complicated registration

process (Gardiner at al. 2021). There is limited rigorous research on what strategies are effective at increasing employer interest and participation in apprenticeship. Below we discuss findings from one study that tested an employer engagement strategy, as well as lessons learned from other descriptive analyses of employer engagement in apprenticeship.

Evidence of a proactive approach to engagement. The AAI evaluation included a random-assignment demonstration to test the impact of marketing apprenticeships to employers to engage and encourage them to register apprenticeship programs (Trutko et al. 2022). Employers in the treatment group were contacted by staff trained in consultative sales,[50] while employers in the control group were not contacted by staff. The study found a statistically significant 12 percentage point impact of the consultative sales approach on employer registration of apprenticeship programs for only one of the two grantees involved in the demonstration. The grantee that had the most success recruited employers from a single industry, did not focus on a particular age group of apprentices, and had consistent staffing.

Lessons learned about employer engagement. Several studies have looked at strategies for employer engagement:

- States that received federal SAE grants implemented a variety of approaches to engage employers, including hosting employer convenings to bolster recruitment, providing one-on-one interaction with employers to facilitate program development and increase buy-in, and focusing efforts on addressing employer misconceptions about apprenticeship through employer outreach (Sattar et al. 2020). The American Institutes for Research recommends that states create public awareness campaigns, coordinate outreach, and help employers understand the financial benefits of apprenticeship ("States as Drivers of Registered Apprenticeship Expansion" 2021).
- Several employer recruitment strategies were associated with greater progress toward apprentice registration targets for AAI grantees. Of the grantees reaching or exceeding 100 percent of their apprentice registration targets, 87 percent had staff dedicated full time to employer recruitment, 67 percent used apprenticeship training representatives to help recruit employers and other sponsors, and 60 percent used financial supports or incentives (Gardiner et al. 2021). AAI grantees also reported strategies they found to be very helpful in engaging employers, including word of mouth (64 percent of grantees), in-person visits (45 percent), and networking using staff connections (45 percent).
- Case studies from nine countries highlighted some of the same strategies used by AAI grantees as well as other components of engaging employers in apprenticeship: changing employers' perceptions of apprenticeships, using intermediaries to help employers navigate the apprenticeship system, understanding the local labor market, building good employer relationships, setting clear targets and goals, developing a flexible training program with a focus on quality that can respond to the needs of individual apprentices and to changes in local demand, providing meaningful incentives, and creating clear pathways (OECD/ILO 2017).

[50] The consultative sales approach has five phases: (1) researching an employer to identify staffing and hiring needs; (2) preparing for an initial conversation with the employer; (3) initial sales call; (4) follow-up with the employer; and (5) closing the deal with a written commitment (Trutko et al. 2022).

Strengthening the Apprenticeship System

Approaches to expand and strengthen the infrastructure of Registered Apprenticeships in the U.S. are increasingly of interest. State apprenticeship agencies play a role in such efforts, as they can leverage their existing workforce and education systems as well as connections to industry at state and regional levels to support expansion. Below we summarize what is known about apprenticeship expansion efforts and where research could help inform future activities.

Program Registration

As previously mentioned, OA and SAAs register apprenticeship programs after approving their standards. Registering an apprenticeship program has potential benefits, including preferential treatment over unregistered programs in the federal context, nationally recognized credentials upon program completion, recognition of program quality, and technical support from registration agencies (Collins 2019).

Several papers have described the registration process as complicated and possibly a deterrent to potential sponsors—especially in industries like IT where skill demands and competencies change rapidly. A brief survey of more than 400 businesses and organizations about their experience with launching apprenticeships found that two in five of those surveyed were challenged by the process of registering an apprenticeship program and navigating differing state and/or federal processes (Colborn and Jenkins 2015). Unregistered programs may be more appealing to employers because they can design a program to be what they want it to be, there is less paperwork, and they don't have to deal with the cumbersome application process (Brown and Amoyaw 2018).

Other papers have described potential solutions to the challenges, including the following:

- **Using technology to streamline and standardize the registration process.** A central helpline or chat function supported by technical staff, prepopulating registration forms, and providing interactive and responsive guidance along with forms can simplify the registration process (Elliott et al. 2022).
- **Intermediaries to help employers with the registration process.** Intermediaries can play a key role in the registration process by assisting employers with designing programs that meet required standards and assisting sponsors with their applications (Collins 2019). DOL has funded industry intermediaries to serve this role, and some intermediaries were found to have exceeded their targets for the number of new programs developed (Lerman and Kuehn 2020).
- **Offering incentives for employers to register apprenticeships.** Beyond making the registration process easier, McCarthy and Parton (2017) recommended that policymakers engage employers by linking registration to financial incentives and creating incentives for employers to join forces and develop programs together.

Data and Performance Management Systems

Data on program performance is necessary for measuring apprenticeship outcomes and improving apprenticeship programs. The federal government tracks data on registered apprentices using RAPIDS.[51] RAPIDS tracks descriptive data including the number, demographics, and occupations of registered apprentices. It also serves as case management software for sponsors. Both OA and SAA states report individual-level data to RAPIDS, which, as of 2022, included data on apprenticeship from 48 states and territories and the United Services Military Apprenticeship Program.[52] Improved data collection on Registered Apprenticeship activities and outcomes is a priority for many states, experts, and apprenticeship sponsors (Advance CTE 2020; Hauge and Parton 2016). However, RAPIDS lacks data on earnings outcomes beyond the program exit date and does not have data on unregistered apprenticeships. In a 2020 survey, only 10 states reported tracking apprentice outcomes. Of those states, four reported that the source of outcomes data was unemployment insurance wage records, three cited surveys of apprentices, two used a combination of wage records and surveys of apprentices, and one state was unable to identify the source (Rosenberg and Dunn 2020). In addition, it is estimated that almost half of apprentices take part in unregistered apprenticeships, which RAPIDS does not track (Collins 2019).

Data issues have also been raised in the context of youth apprenticeships. Because the programs are relatively new, state youth apprenticeship programs do not always have data collection systems, coordinated data efforts between states and local communities are sometimes underdeveloped, there may be no clear sense of which of the multiple stakeholders is responsible for collecting, reporting, and sharing the data, and the lack of uniformity in definitions and delivery can lead to reporting discrepancies (Advance CTE 2019). Additionally, in the RAPIDS system youth apprenticeships cannot be distinguished from traditional apprenticeship programs (Advance CTE 2020). With this in mind, Advance CTE (2020) made a series of recommendations for improving data collection efforts, including (1) establishing data collection and sharing agreements between partners with the help of intermediaries in delegating data collection between partners; (2) beginning with data that are necessary for accountability and reporting and then expanding to other data collection; and (3) relying on existing systems when possible (e.g., community colleges could include apprenticeship participation in their student information systems). Among its recommendations to advance youth apprenticeship opportunities, Partnership to Advance Youth Apprenticeship (Advance CTE 2020) suggested that state leaders use data to inform program creation, implementation, and accountability for continuous improvement in outcomes for students and employers.

[51] "What is RAPIDS?" U.S. Department of Labor, accessed December 13, 2022, https://www.apprenticeship.gov/help/what-rapids.

[52] "Registered Apprenticeship National Results Fiscal Year 2021 10/01/2020 to 9/30/2021," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2021.

Data systems other than RAPIDS may collect data on registered and unregistered apprentices. WIOA requires quarterly performance reporting for apprentices served by WIOA-funded grants using the Workforce Integrated Performance System, including unregistered apprentices.[53] In addition, various agencies conduct nationwide information gathering on employer-provided training, which can provide data on unregistered (and registered) apprenticeships:

- The National Household Education Surveys Program last conducted the Adult Training and Education Survey in 2016.
- The National Training, Education, and Workforce Survey is in development. The survey will ask about prevalence of nondegree credentials and work experience programs.
- The Occupational Requirements Survey, administered by the U.S. Bureau of Labor Statistics, asks employers about skill requirements and the nature of education and training for workers.
- The household-based Survey of Income and Program Participation, administered by the Census Bureau, includes some questions about training participation.
- The Program for the International Assessment of Adult Competencies, also known as the Survey of Adult Skills, is an international survey administered by the Organisation for Economic Co-operation and Development that collects data on workplace skills to help countries understand their education and training systems (American Workforce Policy Advisory Board 2020).

DOL has invested in efforts to improve data collection. In 2010, the Departments of Labor and Education partnered to issue Workforce Data Quality Initiative grants, some of which were used to improve apprenticeship data tracking. The grants aim to connect state-level workforce and education longitudinal data systems, enabling agencies to create databases that track individual-level data from pre-K to the workforce. DOL has also invested in the Apprenticeship Data Alignment and Performance Technical Assistance Center operated by the Council of State Governments. Other federal efforts include the American Workforce Policy Advisory Board's (AWPAB)'s detailed list of data elements that should be collected on employer-provided training, including apprenticeships (American Workforce Policy Advisory Board 2020). These elements included the following:

- the amount and intensity of employer-provided training including share of workers and employers participating by industry and employer size, dollars spent annually, the annual number of employee hours, and employer assessments of impact;
- employers' financial metrics correlated with employer-provided training investment; and
- demographics of trained workers.

[53] "Workforce Integrated Performance System (WIPS)," U.S. Department of Labor, accessed December 13, 2022, https://www.dol.gov/sites/dolgov/files/ETA/performance/pdfs/WIPS_Quick_Ref_Guide.pdf.

The AWPAB also recommended expanding several federal surveys, namely the Census Bureau's Annual Business Survey or Annual Capital Expenditures Survey and the Bureau of Labor Statistics' National Compensation Survey, to capture the prevalence and cost of employer-sponsored training among firms and workers (American Workforce Policy Advisory Board 2020). Surveys could ask respondents to report this information for different types of training, including apprenticeships. The AWPAB also recommended a new firm-level survey to capture the share of employers providing training, including apprenticeship, and the share of workers receiving the employer-provided training. The survey could collect information by industry and employer size, the intensity of employer training (e.g., training dollars per worker and average employee hours in training), financial metrics of firms, and employee characteristics, including among other things occupation, employment status (i.e., full-time, part-time, seasonal, etc.), remote or on-site worker, and job tenure (American Workforce Policy Advisory Board. 2020).

Role of Technology in RAPs

Rapid technological change creates challenges for education and training systems to keep pace with advances (Aggarwal and Aggarwal 2021). It also has the potential to improve the implementation of instruction and program processes. The International Labour Organization Toolkit for Quality Apprenticeships[54] describes how apprenticeship programs around the world are harnessing technology, including promoting apprenticeships through online career guidance portals, recruiting apprentices using digital platforms to match apprenticeships and employers, conducting online tests to select apprentices, using online portals to create coordinated support between providers and employers, using digital instruction to enhance learning, monitoring training through online self-assessments and logs, and using mobile apps and online portals to share information and network (Aggarwal and Aggarwal 2021). Technology also has benefits and challenges for apprentices. There is no rigorous research showing the impact of technology on apprenticeship programs or apprentice outcomes; however, descriptive studies highlight potential benefits and challenges.

Benefits of technology for apprenticeship programs. As previously described, technology could be used to make the apprenticeship registration process easier for employers and sponsors. Technology could also help with managing apprenticeship programs and tracking performance and outcomes. WorkHands is an example of a mobile app that is designed to simplify the management of apprenticeships. It is intended for apprenticeship coordinators, employers and supervisors, and apprentices for several apprenticeship program processes, including onboarding, tracking OJL hours and competencies, and generating auditable compliance reports.[55] Additionally, technology enabled some apprenticeship programs to continue during the COVID-19 pandemic—recruiting and enrolling participants online, accepting scanned or photographed eligibility documents and digital signatures, and

[54] See "Digital Toolkit for Quality Apprenticeships," International Labour Organization, accessed January 15, 2023, https://www.ilo.org/global/topics/apprenticeships/publications/toolkit/lang--en/index.htm.

[55] See "WorkHands," WorkHands, accessed January 15, 2023, https://www.workhands.us/.

providing online technical instruction and work-based training (Wolff, Koller, and van Docto 2020). The DOL website describes additional benefits of virtual apprenticeships and examples of apprenticeship partners that have successfully transitioned to delivering components of apprenticeship in a virtual setting.[56]

Benefits of technology for apprentices. Online learning can allow students to learn at their own pace and on their own schedule. In some cases, as evidenced during the pandemic, technical instruction and work-based training can be conducted in parallel to accelerate the apprenticeship program and place apprentices in employment more quickly (Wolff, Koller, and van Docto 2020). In addition, online learning can eliminate long commutes between home and school and work, which can be especially important for rural apprentices. Technology also has the potential to make apprenticeships more inclusive. The Partnership on Inclusive Apprenticeship provides employer assistance with apprenticeship programs that includes, among other things, purchasing accessible technology to support the success of apprentices with disabilities (Draeger 2021). Moreover, the nature of remote-friendly work in the IT sector can support inclusion and accessibility for people with disabilities (Draeger 2021).

Challenges of technology for apprenticeship programs. As previously described, rapid changes in technology make it difficult to establish apprenticeship industry standards that are uniform and current. Additionally, moving to online programming increases the need for apprenticeship programs to also provide coaching and navigation support (Wolff, Koller, and van Docto 2020). Researchers have recommended improving the technical capabilities of intermediary staff and workforce development professionals to advance high-quality programs (Elliott et al. 2022).

Challenges of technology for apprentices. Despite some benefits of online learning, multiple rigorous evaluations find that higher education students taking online classes perform worse than their counterparts taking in-person classes (see Cellini 2021 for a review of these studies). Additional technology-related challenges were revealed during the pandemic. For example, apprentices living in rural areas may lack internet access to complete their RTI or homework. As a result, students can struggle with the remote aspects of hybrid apprenticeship models (Boren et al. 2021). Moreover, not all occupations and industries can support remote work (Draeger 2021).

[56] "Delivering Apprenticeships Virtually," U.S. Department of Labor, accessed December 13, 2022, https://www.apprenticeship.gov/delivering-apprenticeships-virtually.

Key Takeaways and Knowledge Gaps

Since one of the first U.S. studies documenting the higher earnings of workers who participated in apprenticeships (Reed et al. 2012), numerous U.S. studies, including DOL-funded studies, have examined apprenticeship. In addition to corroborating the benefits to workers, studies have documented the positive return on investment that apprenticeships provide for employers, as well as the positive benefits to society. Given these findings, more recent apprenticeship funding has focused on ensuring that apprenticeship opportunities are more broadly available. Subsequent studies have described strategies that may be useful for promoting apprenticeship as another postsecondary option through youth apprenticeships and pre-apprenticeships, expanding apprenticeships into nontraditional industries and occupations—those outside of the traditional construction trades—and making apprenticeships more accessible to populations traditionally underrepresented in apprenticeships, including women, people of color, and people with disabilities. Key takeaways from these studies highlight the importance of

- educating the public about apprenticeship as a postsecondary option;
- educating and engaging employers;
- establishing strategic partnerships with colleges and other partners;
- providing supportive services to support the completion of apprenticeships;
- streamlining the registration process to encourage new apprenticeships; and
- understanding and embracing the role of technology in creating, registering, and managing apprenticeships, as well as the role in training provision, program access, and completion.

Despite recent evidence of the positive effects of apprenticeship, questions remain about whether benefits are consistent across industries, employers, workers, and program models. Additionally, there is little rigorous evidence on the impact of pre-apprenticeship and youth apprenticeship programs, programs developed through community colleges and other intermediaries, and effective strategies to increase diversity among apprentices. DOL has funded research studies, including the ABA evaluation, with the aim of building evidence on some of these aspects of apprenticeship, and more information will be available in the next few years as these studies release findings.

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