## U.S. Apprenticeship Overview

We might tend to think about typical skilled trades when asked about careers based in apprenticeship; electricians and plumbers or perhaps blacksmiths for the more historically inclined. Apprenticeships span a wide variety of industries including Educational Services and Health Care and, for many, represent the best opportunity to improve their lives. One study estimated the increase in career earnings of participants to be nearly $100,000 and $240,000 for participants who completed their program, over non-participants with similar characteristics[i] and a net social benefit of more than $49,000 per person. A Washington State study found that, for every $1 in state investment, taxpayers saw a net benefit of $23[ii] stemming from apprenticeship programs. Even theorizing an upward bias on these estimates, the benefits are significant and visible. Between Oct. 1 2019 and Sep. 30 2020, over 221,000 individuals entered apprenticeships while 82,000 graduated from their respective apprenticeships. Although apprenticeship utilization rates fall well below those of European countries, the 3,143 new programs established in the United States in fiscal year 2020 represent a 73% increase from 2009 and the number of active Registered Apprentices grew by 51%[iii]. A study from Harvard estimated that increasing apprenticeship occupations could help fill 3.2 million jobs[iv]. While the U.S. has been slower to increase apprenticeship opportunities, Department of Labor efforts to increase awareness and opportunities, including the American Apprenticeship Grants program, could lead to improved utilization and expansion, more fully realizing the benefits of apprenticeship education.

## Apprenticeship Equity and Technical Challenges

Taking a step back we might ask ourselves if apprenticeship opportunities can be effective tools in reducing income inequality and employment equity. To answer these questions, it is important to review existing programs and outcomes for apprentices to assess how current programs are performing in this regard. So who exactly is making use of these programs? What are the demographic characteristics that reflect who receives apprenticeship training and what evidence is there to suggest that discrimination is at play in apprenticeship programs? We'll use samples of participants from the Registered Apprenticeship Partners Information Database System (RAPIDS) provided by the Employment and Training Administration (ETA) to look into these issues.

Unfortunately, we face gaps in available data, making an analysis of apprenticeship equity more difficult. For example, it would be ideal to collect the demographic characteristics of program applicants, not just participants and we would prefer to have a complete universe of demographic data. Similarly, the percentage of apprentices who do not provide demographic information has jumped from 0 to 10 percent;

almost all of this increase occurred between 2017 and 2019. Despite these challenges, the RAPIDS system contains a large amount of demographic and earnings data on apprenticeship participants as well as individual programs. With this data we created this high level assessment of apprenticeship equity.

Our first assessment of equity focuses on analyzing the distribution of apprenticeships compared to the relevant demographics of the broader workforce. We use the civilian labor force numbers as a proxy for apprenticeship eligible individuals while acknowledging that apprenticeship applicant demographics may differ from the general labor force. Additionally, because individuals who are incarcerated are not included in the civilian labor force, they are treated in a separate section below.

## Racial and Hispanic Equity in Apprenticeships

Of the 686,000 apprentices who provided demographic data, 77.5 percent identified as White, 15.3 percent as Black, 2.9 percent American Indian/Alaska Native, 2.1 percent Asian, 1.6 percent Native Hawaiian/Other Pacific Islander, and 0.5 percent as multi-racial. With regard to ethnicity, 567,000 apprentices provided information with 18.3 percent identifying as Hispanic. In 2019, 27.4 percent of apprentices identified as Hispanic, a 148 percent increase over the 2010 level; Hispanic shares of apprenticeships increased in every year except 2012. We need to understand how these distributions evolve over time to better put these data into context and to assess whether apprenticeship equity has been stable over time, relative to the labor force share of these various groups.

We start by assessing changes in the distribution of apprenticeships between 2010 and 2019. Table 1 describes the changes in apprenticeship distributions as percentages of apprentices who provided demographic information.

**Table 1. Share of Apprenticeship Participants (2010-2019)**

| Racial Group | Share of All Apprenticeships 2010 | Share of All Apprenticeships 2019 | Percent Change in Apprenticeship Share |
|---|---|---|---|
| American Indian or Alaska Native | 3.4% | 1.8% | -46.3% |
| Asian | 1.7% | 2.2% | 27.9% |
| Black or African American | 12.8% | 17.1% | 33.3% |
| Multiple-Race Selected | 0.0% | 1.4% | 3248.1% |
| Native Hawaiian or Other Pacific Islander | 1.4% | 1.3% | -6.4% |
| White | 80.7% | 76.2% | -5.6% |

Several factors might be instrumental in changing the distribution of apprenticeships. For instance, distribution changes could be the result of increased awareness of apprenticeship programs and benefits; with better information, individuals might choose apprenticeships over other types of employment. Distribution changes could be indicative of active efforts by apprenticeship operators to increase diversity. It is difficult to decompose the reasons for change, something we'll leave for future survey research. Here, we are looking at the distribution and changes within the distribution as a first diagnostic test of equity. To do this we compare the 2010-2019 RAPIDS data demographic characteristics to the national civilian workforce. What the changes in the distribution show is that apprentices have become more diverse over time, providing some evidence that efforts to boost participation and improve outcomes have been effective.

With this data in hand the analysis moves to a comparison with the general labor force. Table 2 provides a comparison of the share of apprentices with the general labor force by racial group.

**Table 2. Comparison of Apprenticeship Distribution and Labor Force**

| **Racial Group** | **Annual Average Apprenticeship Share 2010-2019** | **Annual Average Share of Labor Force 2010-2019** | **Change in Share of Labor Force 2010-2019** |
|---|---|---|---|
| American Indian or Alaska Native | 3.1% | 1.0% | 43.8% |
| Asian | 2.1% | 5.6% | 35.8% |
| Black or African American | 14.9% | 12.2% | 8.7% |
| Two or More Races* | 0.4% | 1.9% | 20.8% |
| Native Hawaiian or Other Pacific Islander | 1.6% | 0.4% | 40.6% |
| White | 78.1% | 79.1% | -4.8% |
| (*) Labor force data for individuals of two or more races is available only back to 2015. | | | |

What can be gleaned from Table 2 is an increase in the non-White labor force, similar to the decline in the share of White apprentices. This in isolation might give us the impression that apprenticeship equity is already a reality but if we examine the distribution among non-White apprentices we find more mixed results. While apprentice shares for Black, American Indian/Alaska Native, and Native Hawaiian/Other Pacific Islander apprentices exceed their average labor force participation, their representation is similar

to their share of the general labor force. This provides marginal evidence for racial equity in apprenticeship distribution. However, the average apprentice share of Asian apprentices and apprentices of two or more races fall well below the labor force share. Whether these issues are structural we cannot address here but we will make note of two important issues. Firstly the grouping of Asian sub-groups into a single category may mask further inequities among these various sub-groups. This is a topic we will explore in a separate section. Secondly, there are possible identification issues associated with apprentices of two or more races as survey respondents may self-select into a single racial group without being made aware of the multi-racial category. Follow-up surveys to correct and update data could be utilized to check for this possibility or provide additional evidence of inequities for this particular group.

Beyond the general distribution of apprenticeships, we might question if there are inter-industry differences in racial concentrations. If, for instance, Black apprentices tend to be concentrated in service apprenticeships or lower-paying apprenticeships that could be indicative of factors ranging from self-selection into certain industries to discrimination. Stepping into 23 non-government industries what we find is consistent participation across racial groups. Black apprentice representation was higher than their labor force representation in 17 industries; for American Indian or Alaska Native apprentices and Native Hawaiian or Other Pacific Islanders, above average representation occurred in 18 industries. This includes construction apprentices, where racial group participation rates mirrored the civilian workforce, except for Asian apprentices. For apprentices with identifiable industries, 57 percent participated in a construction related industry. While we were not able to identify wage differences based on race, participation rates provide some evidence of equity by race.

We've discussed equity by race, noting that some racial groups are well represented compared to their respective share of the labor force, we must now take a look at equity by Hispanic ethnicity. Apprentices identifying as Hispanic represent 18.3 percent of all apprentices in our data, with an average annual proportion of 15.5 percent. Hispanic representation among apprentices has been increasing between 2010 and 2019 with a large jump in representation in 2017 from 14.4 to 22.4 percent. We cannot draw conclusions about this jump from the RAPIDS data alone, but improvements in survey questions or better self-identification are possible reasons for a large one year increase in representation. The average labor force proportion for Hispanics is 16.3 percent between 2010 and 2019; Hispanic representation in the labor force increased by 20.2 percent over the same period, reaching 17.8 percent in 2019. This demonstrates to us that recently Hispanics have been overrepresented in the Registered Apprenticeship programs, but have been historically underrepresented. Interestingly, 36 percent of Hispanic apprentices

are listed as being employed by training programs classified as Technical and Trade Schools (NAICS 611513) while only 11.2 percent of non-Hispanic apprentices are employed under the same NAICS code. While some of this difference might be attributed to misclassification, we would not expect such a large gap between the two groups. It is not clear why this is the case, but it moves our discussion forward to possible data improvements and future research.

Before moving to gender equity, we should mention differences in completion rates by race, which give evidence of structural and systemic differences in the performance and outcomes for various racial groups. From an equity standpoint, there should be no significant difference in completion rates for individuals of various racial groups or by gender. We might tolerate some small differences that occur due to statistical noise or large variances; in general, large differences in completion rates point to something more systemic preventing certain groups from achieving their apprenticeship goals. While completion rates are below 35 percent for all racial groups, which speak to the general difficulty of apprenticeships, completion rates for White apprentices reached 33 percent but only 24 percent for Black apprentices. Asian apprentices are the only other group to eclipse 30 percent completion. This data suggests that there are factors that are negatively impacting completion equity.

## Gender[1] Equity in Apprenticeships

We've taken a look at racial equity, but how are women apprentices represented in these programs? Historically, women have not been well represented in apprenticeship programs or in construction industries in general. A Mathematica study produced for the Department of Labor found that women participate at lower rates, are concentrated in social services apprenticeships, and have lower completion rates than men. Women interviewed for the study indicated that difficulties securing child care and lack of pay for classroom instruction were significant barriers to participation and completion, a common narrative for not only apprenticeships, but labor force participation in general. Knowing that skilled trade apprenticeships can provide economic self-sufficiency, what barriers exist aside from the ones just mentioned that prevent women from participating in these good paying apprenticeships? According to the same Mathematica study, incomplete knowledge of skilled trades including necessary skills and relative benefits, unrealistic expectations and, most troubling, explicit harassment from male coworkers also impact women's participation and completion rates. While regulations prohibit discriminatory harassment, widespread complaints suggest this unacceptable reality for obvious legal and ethical reasons as well as for efficiency and effectiveness of program investment. Our sample of apprentices shows

[1] Gender distinctions beyond the binary Male/Female are not available.

women with an average annual participation rate of 8.5 percent. In both 2018 and 2019, just over 10 percent of apprentices were women. Unfortunately, women are less well represented in skilled trade apprenticeships. Over our sample 2010-2019, only 3.5 percent of construction apprentices were women. While causes of this segregation may range from outright discrimination to self-selection, the lack of representation of women in construction apprenticeships is a hardened feature that requires additional attention to rectify.

## Inmate Apprenticeship

It has been argued extensively that inmate apprenticeships help reduce recidivism and produce cost savings for state governments. A 2010 study found exactly this effect, noting that job and education programs reduce or delay recidivism. While a primary focus of the study is the cost savings for the state, previously incarcerated individuals less likely to re-offend can experience savings in the form of retained wages and other non-pecuniary benefits as well. Assuming that inmates would have access to such information, or even a reasonable belief that job programs can help reduce recidivism, we should expect that inmates would apply to apprenticeship programs at rates matching their proportion of the prison populations. This is a reasonable assumption if two inmates of different races are convicted of similar crimes so as to maintain similar apprenticeship eligibilities.

Despite the potential for cost savings and reduced incarceration and recidivism rates, it has been documented that prison education and training programs suffer from defects ranging from long wait times to poor quality[v]. Inmate apprentices also tend to be older and have substantially lower wages than those apprentices not in prison. If older inmate apprentices find it more difficult to find work upon release or receive lower wages, we would be concerned about the potential for recidivism. Tracking inmate apprentices upon release would allow better insight into the quality of prison apprenticeship programs.

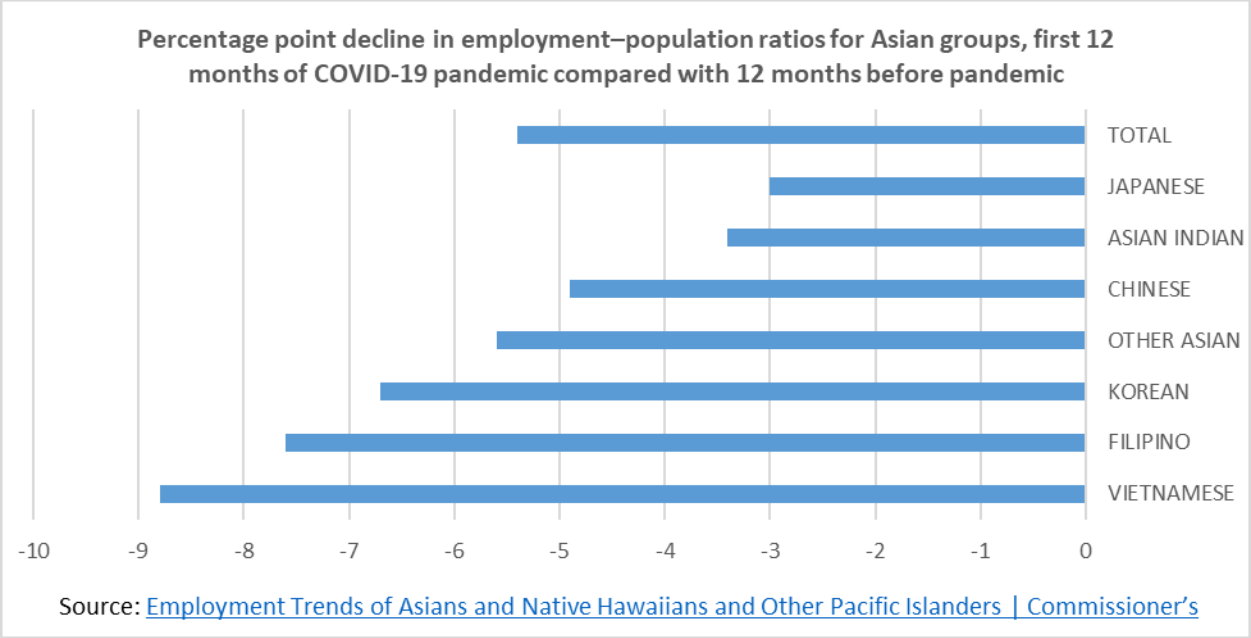
While the civilian labor force is 12 percent Black, the proportion of Black inmates was over 38 percent in June 2021. Using published Bureau of Justice Statistics (BJS) reports, the percent of Black inmates with a non-violent offense is around 37 percent in most years. Roughly, 35 percent of incarcerated apprentices were Black while 62 percent were white. Of the roughly 39 thousand apprentices who provided ethnicity data, only 8.5 percent indicated being of Hispanic ancestry. While it is difficult to know why Hispanics struggle to find placement in apprenticeship programs, this estimate does indicate a potential problem area for inmate apprenticeships. Interestingly, while selection issues may be pervasive in inmate apprenticeships seems to have little effect on representation among completed apprenticeships; 62 percent of those who completed an inmate apprenticeship were 62 and 35 percent identified as Black.

Hispanic apprentices accounted for 7.6 percent of completed apprenticeships again remarkably similar to their prison representation.

Noting that Inmate populations tend to skew heavily toward male prisoners at both the federal and state levels, we are still interested at the distribution of apprenticeships among male and female inmates. From published BJS reports, female prisoners whose most severe offense is classified as non-violent make up roughly 10 percent of the total prison population. Between 2010 and 2019, 14 percent of inmate apprenticeships were awarded to women, outpacing their overall representation among the population.

## Future Research on Racial and Gender Equity in Apprenticeship Training

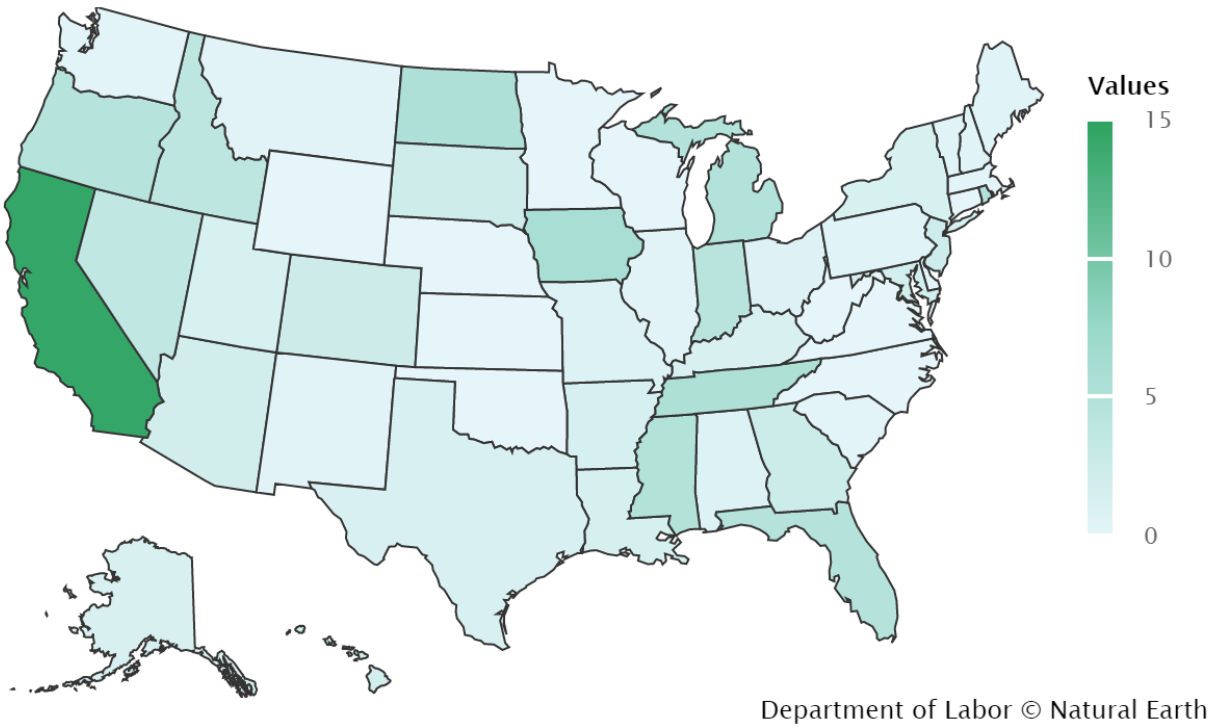
There are two related topics that highlight the challenge of our analysis of apprenticeship equity, one of which we mentioned above: decomposing apprenticeship participation and outcomes for individuals belonging to various Asian and Hispanic subgroups. Unfortunately the data cannot tell us to which subgroup with which any individual apprentice identifies. This would be useful information that could be used to draw out systematic issues facing any given subgroup. For example, if individuals of a particular Asian subgroup lacked access to public transportation that prevented them from fully participating in apprenticeship programs, this might be masked by higher than expected participation of another Asian subgroup. This is of course a highly stylized hypothetical meant to illustrate the issue of masking through aggregation. Such masking effects can in fact be demonstrated using the employment-population ratio. The employment-population ratio for all racial groups declined by 4.7 percentage points and 5.4 percentage points for Asian populations during the pandemic — the employment-population ratio for Asians remained above the average for all workers during the pandemic. By breaking out the overall decline in employment-population ratio, we can see the effect was not uniform across various populations.




Source: Employment Trends of Asians and Native Hawaiians and Other Pacific Islanders | Commissioner's

Eliminating this aggregate masking would be very useful for future research and brings us to our second issue, adjusting for population and apprenticeship locations. Racial groups are not uniformly distributed across the United States, meaning that we should account for concentrations of various populations to get a better sense of apprenticeship accessibility and labor mobility. From our RAPIDS data, 14 percent of apprentices participated in programs registered in California. As we can see from the chart below, Hispanics and individuals of two or more minorities have substantial representation and therefore we might expect an overrepresentation compared to the national sample. Contrast this with a state like South Carolina, which has a highly represented Black population, but only 4.8 percent of apprenticeships. Unfortunately, California also represents 36 percent of observations with missing race data, complicating the analysis. This is another topic that will be left to future research.

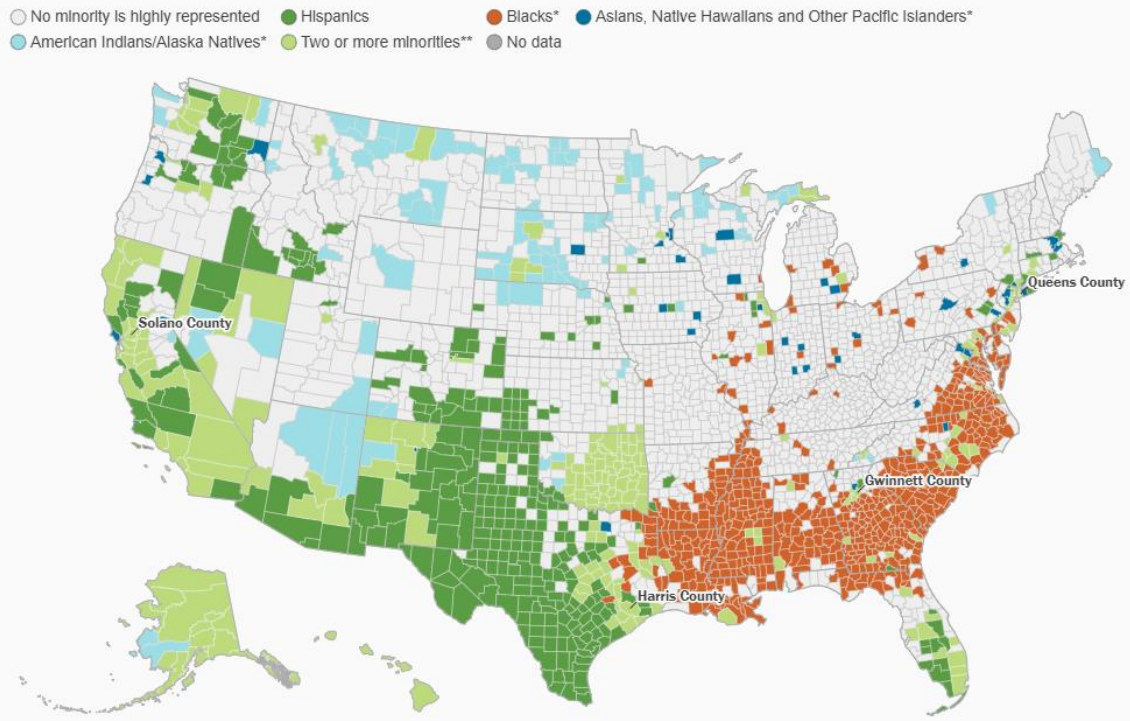
Percent of Total Apprentices (2010–2019)




Department of Labor © Natural Earth

**WHERE RACE-ETHNIC MINORITY GROUPS ARE HIGHLY REPRESENTED, BY COUNTY**

HOVER OVER COUNTIES TO VIEW STATISTICS




*Source: William H. Frey analysis of US Census population estimates, 2018*

*A group is highly represented if its share of the area population is larger than its share of the national population for Hispanics (18.3%), blacks (12.5%), and Asians, Native Hawaiians and Other Pacific Islanders (5.9%) and at least 4% for American Indians/Alaska Natives, or persons identifying as multiracial*

**Non Hispanic members of group*

***Two or more minority groups are highly represented or persons identified as multiracial are highly represented*

[i] Reid, D., Yung-Hsu Liu, A., Kleinman, R., Mastri, A., Reed, D., Sattar, S., & Ziegler, J. (2012, July 25). *An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States*. An Effectiveness Assessment and Cost-Benefit Analysis of Registered Apprenticeship in 10 States.

[ii] Hardcastle, A. (2017, June). *Expanding Washington STATE apprenticeships for the 21st Century: Summary of the benefits to individuals, the public and employers*. Academia.edu. https://www.academia.edu/39166870/Expanding_Washington_State_Apprenticeships_for_the_21st_Century_Summary_of_the_Benefits_to_Individuals_the_Public_and_Employers.

[iii] Fuller, J. B., & Sigelman, M. (2017, November). *Room to Grow: Identifying New Frontiers for Apprenticeships*. Harvard Business School. https://www.hbs.edu/managing-the-future-of-work/Documents/room-to-grow.pdf.

[iv] Fuller, J. B., & Sigelman, M. (2017, November). *Room to Grow: Identifying New Frontiers for Apprenticeships*. Harvard Business School. https://www.hbs.edu/managing-the-future-of-work/Documents/room-to-grow.pdf.

[v] Hecker, I., & Kuehn, D. (2019). (rep.). *Apprenticeship and the Justice System*. Urban Institute. Retrieved from https://www.urban.org/sites/default/files/publication/99822/apprenticeship_and_the_justice_system_0.pdf