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# The Value of Education and Training After High School

## How Postsecondary Credentials Impact Earnings

**W**hat is the value of the education and training that students receive after completing a high school diploma? This is a critical question for individuals seeking postsecondary education and training, for employers hiring individuals with different postsecondary training experiences, and for policymakers who direct public funding toward education and training. There are a number of different options for postsecondary education and training available, and individuals earn different types of credentials for these experiences, including credit-bearing degrees and certificates, licenses and industry certifications, and noncredit training and apprenticeship certificates (see Table 1 for a brief overview).<sup>1</sup> Understanding the value of these different experiences and credentials can help individuals, employers, and policymakers make smarter investments.

However, measuring the benefits of education and training for individuals can be challenging. For example, one important benefit of education is the knowledge and skills that individuals obtain; however, many programs do not document this—and when they do, it is difficult to compare knowledge and skill growth across

TABLE 1  
Types of Credentials Discussed in This Perspective

Type of Credential	Examples	Education and Training Providers	Funding Sources
Degree	Bachelor of arts in psychology, applied associate of science in medical information technology	Community colleges, universities, for-profit institutions	U.S. Department of Education, state governments, individuals
Credit-bearing certificate	Certificate in industrial welding, emergency medical technician certificate	Community colleges, some universities, for-profit institutions	U.S. Department of Education, state governments, individuals
Non-credit certificate	Licensed vocational nurse certificate, cybersecurity certificate	Community colleges, for-profit institutions, training centers	U.S. Department of Labor, state governments, individuals
Certification	Project Management Institute certification, Automotive Service Excellence certification	Professional organizations, associations, training centers	Industry, individuals
License	Manicurist license, real estate license	State agencies, training centers	State governments, individuals
Apprenticeship	Electrician, information security analyst	Employers in partnership with colleges or training centers	U.S. Department of Labor, industry, individuals

NOTE: For more information, please see the companion report, Daugherty, 2021.

different fields and types of credentials. One common approach to measuring the financial value that credentials offer is to examine the gains in earnings that individuals experience when they complete a credential, also referred to as the *economic returns* to a credential. Gains in earnings capture the financial benefits that individuals see from holding a credential, and they also signal the price that employers are willing to pay for that credential. Earnings do not capture all of the benefits that individuals and society realize from education and training beyond high school; for example, postsecondary credentials may open up opportunities for jobs with better working conditions, increase civic engagement, and improve health and well-being. However, earnings offer a simple way to capture and

compare value across different types of credentials, fields, and individuals.

In this Perspective, we summarize the research on the gains in earnings that individuals experience when they earn postsecondary credentials, or the returns to credentials. We start by examining average returns for different types and levels of postsecondary credentials. We then examine variation in earnings outcomes for credentials earned in different fields. Finally, we examine how returns to postsecondary credentials vary by gender, race, and ethnicity.

## Many Types of Postsecondary Credentials Lead to Gains in Earnings

### Credit-Bearing Degrees and Certificates

Studies consistently indicate that degrees and certificates earned at two-year and four-year colleges lead to improved earnings. Findings suggest that higher-level credentials awarded after longer-term programs typically lead to higher returns to earnings than do lower-level credentials.<sup>2</sup> For example, estimates from national survey data suggest that individuals with a bachelor's degree earn approximately \$2.8 million over the course of a lifetime, while individuals with an associate degree earn approximately \$2 million.<sup>3</sup> A study that aggregated data across eight states found that men earn \$4,640 and women earn \$7,160 more annually, on average, after completing an associate degree, while men and women who earn credit-bearing certificates see annual gains of \$2,120 and \$2,960, respectively.<sup>4</sup> In percentage terms, the study findings suggest that men and women achieved gains of 18 and 26 percent in earnings from an associate degree, and they achieved gains in earnings of 7 and 10 percent from credit-bearing certificates.

The evidence has been mixed, however, for shorter-term certificates that require less than one year of coursework. Studies in Ohio and Washington state found negative returns or no benefits to short-term certificates,<sup>5</sup> while others found positive returns that, in some cases, diminished over time.<sup>6</sup>

There is substantial variation in earnings gains for degrees and certificates in different fields and across individuals; we discuss this in later sections.

### Non-Credit Training Programs and Certificates

The U.S. Department of Labor's Workforce Innovation and Opportunity Act (WIOA) and prior Workforce Innovation Act (WIA) provide funding for workforce training programs that typically fall outside the credit-bearing education system. Some of these programs may lead to a certificate, while others may not.

An evaluation of the impacts of WIA Adult Program training for participants between 2003 and 2005 across 12 states found that these programs led to annual earnings gains of approximately \$3,200 for women and \$2,000 to \$2,400 for men annually when compared with individuals who participated in the WIA Adult Program but did not receive training, equivalent to gains of 30 percent for women and 10 to 15 percent for men.<sup>7</sup> Findings from randomized studies are mixed. For example, a study across 12 states did not find positive impacts on earnings from WIA-funded training,<sup>8</sup> while a study of a limited set of WIOA programs in New Orleans found gains in earnings of 26 percent overall.<sup>9</sup> Given that these randomized studies focused on specific programs, they may not be generalizable to all types of noncredit programs.

The research comparing noncredit training with credit-bearing credentials is limited. However, a recent study leveraging national survey data found that gains from credit-bearing certificates led to annual earnings that were approximately \$5,500 higher relative to individuals with noncredit certificates.<sup>10</sup>

## Industry Certifications and State Licenses

Occupational credentials—held by more than one-fifth of Americans<sup>11</sup>—include certifications, which are typically awarded by associations and industry groups, and licenses, which are typically awarded by state licensing bodies.

Estimates of the earnings gains from these occupational credentials vary across studies due to varying data sources and analytic approaches, but most found small to moderate wage increases for both licenses and certifications that

are comparable to those found for subbaccalaureate educational credentials.<sup>12</sup> Studies that compare earnings gains across licenses and certifications have tended to find somewhat higher gains for licenses.<sup>13</sup> Research also suggests that the gains from a certification or license may be greater for individuals who do not hold a bachelor's degree.<sup>14</sup>

### How Do Research Studies Estimate the Returns to Credentials?

There are two primary ways that studies broadly estimate the returns to credentials using statewide or national data. The first approach is to compare earnings across individuals within the same period, examining those who do and do not have credentials and accounting for such variables as location and occupation to attempt to ensure that comparisons are being made across individuals who look similar according to characteristics captured in the data. A key limitation to this approach is that individuals who choose to pursue a credential may have unobserved characteristics (e.g., motivation) that are driving differences in wages rather than the credential itself.

Another approach to estimating the returns to a credential is to examine data over time and compare wages for an individual before and after earning a credential. Using the same person ensures that the comparisons are made within a subject with the same observable and unobservable characteristics, and by using large data sets with many individuals over time, researchers can account for economic conditions and other changes that may drive shifts in earnings. The limitation to this approach is the need for many years of employment and education and training data that can be linked together, restricting the analysis to older, less mobile individuals for whom it is possible to observe a long employment history.

There are also limitations that apply to both approaches. Individuals typically experience a decrease in earnings just before and while they participate in education and training, so estimates of earnings gains may be off if these patterns in earnings are fully dealt with in the analysis. And both types of studies can face issues of generalizability to all individuals and periods when they limit analysis to data that come from a subset of individuals and particular times.

In a few cases (e.g., workforce training funded by WIOA), researchers have been able to conduct randomized experiments in which individuals could be assigned by lotteries to participate in training opportunities. This approach helps to overcome some of the limitations of the strategies described above but can be limited in that it typically focuses on a small subset of programs rather than capturing national or statewide patterns in earnings gains.

## Apprenticeships

The U.S. Department of Labor runs the Registered Apprenticeship program, whose apprenticeships account for a large portion of the apprenticeships offered in the United States. Apprenticeships combine classroom instruction with on-the-job training and typically result in a certificate upon completion. A 2012 study of the registered apprenticeships across ten states found average gains in annual earnings of \$6,595 after six years; these gains diminish somewhat to \$5,839 after nine years.<sup>15</sup> A more recent study in Washington state found gains of \$3,450, equivalent to a 40-percent gain in earnings.<sup>16</sup> There is a national, federally funded study of apprenticeship programs underway, but, as of the end of 2021, results have not yet emerged from that study.<sup>17</sup>

## Earning Multiple Credentials (or Stacking Credentials)

Researchers have also examined earnings gains for individuals who earned multiple credentials to understand whether earning new credentials after an initial credential can provide additional earnings gains. Findings suggest that earning multiple credentials can lead to gains beyond earning a single credential, with total estimates of earnings gains across multiple credentials ranging from 7 percent in Virginia to 37 percent in Ohio.<sup>18</sup> In California and Ohio, the patterns, by length of credential, mirror those for single credentials; individuals who start with longer-term certificates see higher gains from the initial credential and any additional credentials earned than those who start with shorter-term certificates.<sup>19</sup> For example, California data

indicated an overall gain of 45 percent from two credentials earned among individuals who initially earned a long (more than one-year) certificate, while credential-stackers who started with a short-term certificate and went on to earn a second credential realized overall gains of 19 percent.<sup>20</sup> These studies also found that individuals earned more when their second credential earned was a degree, relative to those who earned multiple certificates.<sup>21</sup> Evidence on credential-stacking in Virginia differed, indicating higher gains from earning short-term certificates relative to other types of credentials.<sup>22</sup>

## The Returns to Postsecondary Credentials Vary by Field

Research has indicated that there is wide variation in the returns to postsecondary credentials by field. These differences in returns may be partially driven by the value of the education and training provided but may also be driven by other aspects that affect labor markets, such as the demand for workers in a field and regulatory restrictions that may limit who can enter a profession.

The evidence on bachelor's degrees indicates that individuals with science, technology, engineering, and math (STEM) degrees or degrees in architecture, business, and health care fields tend to accrue higher earnings over their lifetimes, while those with liberal arts and humanities degrees tend to have lower earnings.<sup>23</sup> For associate degrees and certificates, a review of evidence from seven states found that credentials in vocational fields led to larger increases in earnings than those earned in nonvocational fields, and health care credentials led to the highest payoff in six out of seven of the states.<sup>24</sup> For example, a study from

California found that health credentials led to annual earnings gains that ranged from 12 to 99 percent, while non-health programs led to annual earnings gains that ranged from 5 to 10 percent.<sup>25</sup> The credential-stacking literature also indicated the highest gains from health care credentials.<sup>26</sup> For example, individuals in Ohio who started with a health care certificate experienced a 46-percent increase in earnings from stacking credentials, compared with earnings gains of 20 percent for manufacturing and engineering technology and 15 percent for information technology.<sup>27</sup>

There is limited evidence on variation in earnings gains from noncredit certificates, certifications, and licenses earned across different fields, as field of study is not frequently captured for these credentials in national surveys, and single-program studies do not often allow for cross-field comparisons. However, an experimental study of WIOA programs in New Orleans found patterns that mirrored those for college credit-bearing programs, with earnings gains of 55 percent for health care participants, compared with 25 percent for advanced manufacturing and 16 percent for information technology.<sup>28</sup>

## **The Returns to Postsecondary Credentials Vary by Individual Characteristics**

It is also valuable to understand how earnings gains from credentials may vary across individuals with different characteristics. As noted above, findings across states indicated that women realized larger gains, on average, from both certificates and associate degrees.<sup>29</sup> Several studies have found variation across fields by gender, with men

gaining higher returns from short-term certificates relative to women and women experiencing higher returns from long-term certificates.<sup>30</sup> Patterns by gender for credential-stacking are similar to those for single credentials; earnings gains were higher overall for women relative to men, but when broken out by field, men sometimes experienced larger earnings gains in fields with larger male populations, such as engineering technology.<sup>31</sup> The higher gains for women overall appear to be driven, in part, by the greater concentration of women in health care fields.

Findings for training outside the credit-bearing higher education system tend to show similar patterns by gender, favoring women. For example, WIA program estimates indicate that annual earnings gains are approximately \$1,000 higher for women,<sup>32</sup> while apprenticeship research indicates that annual earnings gains for women are approximately \$400 larger than those for men.<sup>33</sup> The evidence on occupational credentials is mixed. Some have found evidence that occupational licensing leads to larger gains in earnings for women.<sup>34</sup>

Many of the studies that leverage state administrative data to examine the returns to educational credentials have not broken out results by race and ethnicity. An older study using national survey data indicated no differences in returns to schooling by race or ethnicity,<sup>35</sup> but more-recent studies on credential-stacking have provided some evidence of disparities. Research in California and Ohio indicated positive returns to credentials (and stacking of credentials) for students of all races and ethnicities, though White and Asian individuals saw the largest earnings gains from earning multiple credentials.<sup>36</sup> Virginia findings indicated no returns to stacking for Black students and large returns for White students.<sup>37</sup> Few studies of occupational

credentials have examined differences by race and ethnicity, though one study found that Black men achieved larger gains in earnings from licenses and certifications relative to White men.<sup>38</sup>

## Conclusion

There are a few key takeaways from this brief review of the literature on the value of education and training after high school. Evidence indicates that credit-bearing credentials earned at colleges, noncredit training, apprenticeships, and occupational credentials can all lead to increased earnings. Furthermore, earning multiple credentials, or stacking credentials, can lead to earnings gains that exceed those from a single credential.

While the differences in data sources and methods across studies limit our ability to directly compare earnings gains across different types of credentials and training, comparisons within studies suggest that the type of credential earned matters. When it comes to occupational credentials, findings suggest that the earnings gains from licenses exceed gains from certifications. The evidence on college credit-bearing credentials suggests that longer-term credentials lead to larger earnings gains, on average, than shorter-term credentials. For example, associate degrees increase earnings more than certificates that require less than two years of coursework, and the evidence on the shortest-term certificates (i.e., less than one year) is mixed, suggesting that individuals do not always see returns to these credentials. And at least one study found that returns to college credit-bearing credentials exceed those to non-credit credentials, but that analysis could not account for

differences in the mix of fields, which may have been an important contributor to these differences.

Evidence indicates that returns to credit-bearing credentials vary widely across fields. Individuals with bachelor's degrees in STEM fields, business, and architecture see the largest lifetime earnings, while vocational credentials lead to the largest gains at the associate degree and certificate level, especially those earned in health care fields.

Finally, the research shows that the earnings gains from credentials and training vary across individuals with different characteristics. Across most types of credentials and training experiences, women tend to experience larger earnings gains from credentials relative to men. White individuals tend to see larger earnings gains from college credit-bearing credentials relative to individuals of color, while there is some evidence that Black men may benefit more from occupational credentials. Differences by gender, race, and ethnicity in the earnings gains from postsecondary credentials are likely related to the sorting of women and White individuals in fields that offer higher returns (e.g., health care), but other factors, such as program quality, work experience, and discrimination, may also play a role.

These findings—that postsecondary education and training offer value, but that earnings gains vary across types of credentials, fields, and individuals—suggest that individuals, educational providers, and policymakers should be thoughtful about choosing which programs to pursue, offer, and fund. It is critical to ensure that these programs are paying off for individuals and society. Foundations and technical assistance organizations are working with states to assess the value of credentials. Earnings gains are considered an important measure of value, with one recommended benchmark for “high quality” postsecond-

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ary credentials being a 20-percent gain in earnings relative to a high school diploma.<sup>39</sup> At the national level, there are efforts to hold institutions accountable for the employment rates and loan default rates of their graduates by withholding financial aid funding.

Providing better information to individuals to facilitate smart decisionmaking is also critical. The federal government has developed a College Scorecard that incorporates information on employment outcomes,<sup>40</sup> and educational providers are working to give students more detailed information that directly links credentials to jobs and earnings.<sup>41</sup> Students are increasingly being provided with robust career counseling in high school and college as part of their postsecondary decisionmaking process, and these discussions are extending beyond interests to metrics on earnings and local job availability.<sup>42</sup> Increasing access to clear information and mandating career counseling may be

important for addressing equity issues among low-income students and students of color, as these individuals may have access to fewer informational sources on high-paying jobs and credentials and may have less time to seek out this information independently.<sup>43</sup>

There were a few ways in which this Perspective was limited in being able to comprehensively describe the value of different types of training beyond high school. First, the discussion focused primarily on earnings gains. Other studies have examined alternative measures of economic returns, such as employment returns in terms of an increased probability of finding a job and whether students achieve the median earnings in a particular field; the patterns may differ according to these measures.<sup>44</sup> In addition, these analyses focused on individuals who completed credentials; other measures incorporate the benefits for all students regardless of whether they graduate, which may be important for holding programs accountable for high dropout rates and accounting for value to all students who enter postsecondary education and training programs.<sup>45</sup> Furthermore, earnings outcomes cannot capture other benefits that postsecondary education and training might offer to individuals and society, such as improved working conditions, health and well-being, and civic engagement. And finally, this Perspective did not discuss the costs (including opportunity costs) of different education and training programs. These programs have widely varying costs, and the proportion of these costs that falls on individuals versus the government also varies. When determining whether postsecondary education and training is a good investment, it is important to consider both the value and the costs of these credentials and programs.

## Notes

- <sup>1</sup> Daugherty, 2021.
- <sup>2</sup> Belfield and Bailey, 2017; Carnevale, Cheah, and Wenzinger, 2021.
- <sup>3</sup> Carnevale, Cheah, and Wenzinger, 2021.
- <sup>4</sup> Belfield and Bailey, 2017.
- <sup>5</sup> Dadgar and Trimble, 2015; Minaya and Scott-Clayton, 2020.
- <sup>6</sup> Bahr et al., 2015; Bettinger and Soliz, 2016; Jepsen, Troske, and Coomes, 2014; Liu, Belfield, and Trimble, 2015; Xu and Trimble, 2016.
- <sup>7</sup> Heinrich et al., 2013.
- <sup>8</sup> Fortson et al., 2017.
- <sup>9</sup> Baird et al., 2019.
- <sup>10</sup> Hester and Kitmitto, 2020.
- <sup>11</sup> Ewert and Kominski, 2014.
- <sup>12</sup> Albert, 2017; Baird, Bozick, and Zaber, 2021; Ingram, 2019; Redbird, 2017.
- <sup>13</sup> Kleiner and Kruger, 2013; Kleiner and Vorotnikov, 2017.
- <sup>14</sup> Baird, Bozick, and Zaber, 2021.
- <sup>15</sup> Reed et al., 2012.
- <sup>16</sup> Hollenback and Huang, 2016.
- <sup>17</sup> Deutsch, Allison-Clark, and Yañez, 2021.
- <sup>18</sup> Bohn, Jackson, and McConville, 2019; Daugherty and Anderson, 2021; Meyer, Bird, and Castleman, 2020.
- <sup>19</sup> Bohn, Jackson, and McConville, 2019; Daugherty and Anderson, 2021.
- <sup>20</sup> Bohn, Jackson, and McConville, 2019.
- <sup>21</sup> Bohn, Jackson, and McConville, 2019; Daugherty and Anderson, 2021.
- <sup>22</sup> Meyer, Bird, and Castleman, 2020.
- <sup>23</sup> Carnevale, Cheah, and Wenzinger, 2021.
- <sup>24</sup> Belfield and Bailey, 2017.
- <sup>25</sup> Stevens, Kurlaender, and Grosz, 2018.
- <sup>26</sup> Bohn, Jackson, and McConville, 2019; Daugherty and Anderson, 2021; Meyer, Bird, and Castleman, 2020.
- <sup>27</sup> Daugherty and Anderson, 2021.
- <sup>28</sup> Baird et al., 2019.
- <sup>29</sup> Belfield and Bailey, 2017.
- <sup>30</sup> Bahr et al., 2015; Bettinger and Soliz, 2016.
- <sup>31</sup> Bohn, Jackson, and McConville, 2019; Daugherty and Anderson, 2021.
- <sup>32</sup> Heinrich et al., 2013.
- <sup>33</sup> Reed et al., 2012.
- <sup>34</sup> Blair and Chung, 2019.
- <sup>35</sup> Barrow and Rouse, 2005.
- <sup>36</sup> Bohn, Jackson, and McConville, 2019; Daugherty and Anderson, 2021.
- <sup>37</sup> Meyer, Bird, and Castleman, 2020.
- <sup>38</sup> Blair and Chung, 2018.
- <sup>39</sup> Duke-Benfield et al., 2019.
- <sup>40</sup> U.S. Department of Education, undated.
- <sup>41</sup> Jenkins et al., 2018.
- <sup>42</sup> Jenkins et al., 2018; Rosen and Molina, 2019; Dalporto and Tessler, 2020.
- <sup>43</sup> Rosen and Molina, 2019; Dalporto and Tessler, 2020.
- <sup>44</sup> For example, Baird, Bozick, and Zaber, 2021; Postsecondary Value Commission, 2021.
- <sup>45</sup> Postsecondary Value Commission, 2021.

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## About This Perspective

The earnings of individuals who participate in education and training after high school can provide information about the value of those credentials. This Perspective provides a review of the evidence on earnings gains associated with various types of postsecondary credentials, including college credit-bearing degrees and certificates, noncredit training and certificates, apprenticeships, and occupational credentials (i.e., licenses and certifications). The evidence suggests that most types of postsecondary credentials can lead to improved earnings, though longer-term credentials tend to be associated with higher returns, and credit-bearing credentials may offer higher returns than noncredit credentials. When individuals go on to earn additional credentials (or *stack credentials*), they can see additional earnings gains beyond those that they receive for the initial credential. There is wide variation in the returns to credentials across different fields. Returns to postsecondary credentials vary for individuals by demographic characteristics; women see larger gains across credentials, while racial and ethnic differences vary by credential types.

## Funding

Funding for this research was made possible by the Lowy family, whose generous gift established the RAND Lowy Family Middle-Class Pathways Center in 2021.

## RAND Lowy Family Middle-Class Pathways Center

This research was conducted within the RAND Lowy Family Middle-Class Pathways Center. The center aims to identify ways to create and sustain middle-class employment in the face of rapidly changing labor-market conditions. The center is part of RAND Education and Labor, a division of the RAND Corporation that conducts research on early childhood through postsecondary education programs, workforce development, and programs and policies affecting workers, entrepreneurship, and financial literacy and decisionmaking.

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