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State Variation in Bachelor's and Associate's Degree Awards in Manufacturing Programs of Study

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Introduction

Technician education programs that prepare students for jobs in the skilled technical workforce are an important part of the postsecondary education landscape in the United States. As such, they have garnered much recent interest from policymakers and researchers. Certain credentials unique to technician education, such as certificates, industry certifications, microcredentials, and badges, may present a path toward retraining or upskilling for some workers, or a route into more lucrative occupations for others. More systematic information on the number and types of credentials awarded in technician education programs is essential if we are to better understand the contribution of these programs to regional economies. Such information could be valuable for colleges, state policymakers, and industry leaders seeking to connect employment opportunities to a trained workforce and promote alignment among education, labor market trends, and regional economic development goals. For researchers, such data could help shed light on the nexus between educational attainment and workforce success.

The Technician Graduates Data Tool allows users to access public-use data on technician graduates spanning a 25-year period from 1995 to 2019, with new data to be added as it becomes available. The data tool facilitates comparisons of trends for multiple programs at the national and state levels, and it allows users to compare trends for a single program of study across states. It has an intuitive interface that allows users to easily select the programs and states they would like examine. A recent update to the tool allows users to download both data visualizations and underlying tabular data.

This brief explores this new data tool. To highlight the tool's new functionality for downloading tables, we examine how the number of bachelor's and associate's degrees awarded in manufacturing fields has changed over time in four states.

Data/Methods

The data for this brief come from the US Department of Education's Integrated Postsecondary Education Data System (IPEDS), arrayed in the Technician Graduates Data Tool. Though the tool allows users to examine trends at any credential level up to and including bachelor's degrees, this brief focuses on trends in the award of associate's and

bachelor's degrees only. We specifically focus on two programs of study related to manufacturing: Industrial Production and Precision Metalwork. Based on discussions with other members of the project team, we chose to examine data from four states: Florida, Ohio, Texas, and Washington.

We queried the Technician Graduates Data Tool using the "Compare Programs within a State" function, selecting "Industrial Production" and "Precision Metalwork" as the programs of interest. We made eight queries using these parameters, accounting for two per state – one for analysis of data at the associate's¹-degree level, the other at the bachelor's-degree level. Practically, there were no bachelor's degrees awarded in Precision Metalwork, so only six results were used to create the figures below.

For each individual analysis we ran, the tool produced a visualization – a trend graph for each program of study in each state – by default. To create a visualization that separates trends for different program areas and degree levels within a state, we downloaded the Excel tables from the Technician Graduates Data Tool and merged them together to create a single summary table. With those summary data, we used Excel to create Stacked Area charts for each state. These charts visualize the frequency of credentials awarded in each program/level combination per year, allowing the reader to see how the 'credential mix' in these manufacturing fields changed over time.

Findings

Figure 1: Industrial Production and Precision Metalwork Degrees Awarded in Ohio from 1995 to 2019

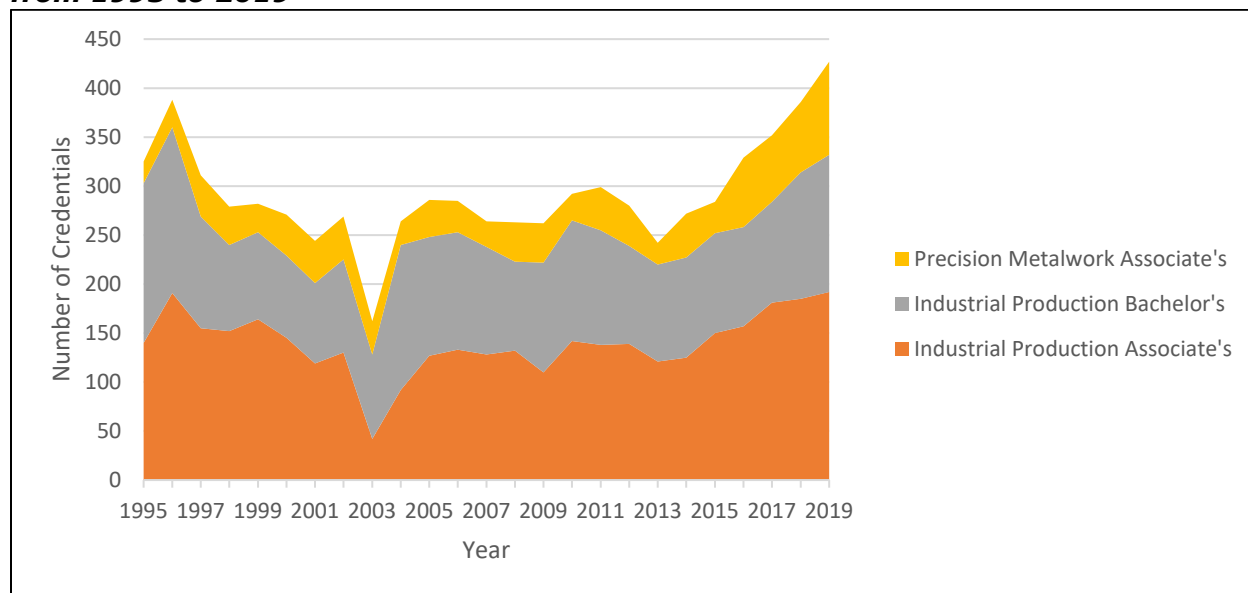


Figure 1 examines variation in the credential mix of manufacturing degrees in Ohio. In the Industrial Production field of study, the state has typically awarded more associate's degrees than bachelor's degrees, at an average ratio of about 4:3. Bachelor's degrees in industrial production only outnumbered associate's degrees in 2003 and 2004, years when the number of overall credentials fell sharply. Since 2015, the ratio of associate's to

¹ We considered any program with the designation of "At Least Two, Less than Four-Year" to be an associate's degree program in this analysis.

bachelor’s degrees in this field has increased to about 3:2. In Precision Metalwork – as is the case for all other states analyzed here – only associate’s degrees were awarded. The annual number of awards in this field was relatively stable from 1995 to 2015 – between 22 and 45. In the most recent years, however, this increased substantially to an average of 77 awards per year, with a high of 95 awards in 2019.

Figure 2: Industrial Production and Precision Metalwork Degrees Awarded in Florida from 1995 to 2019

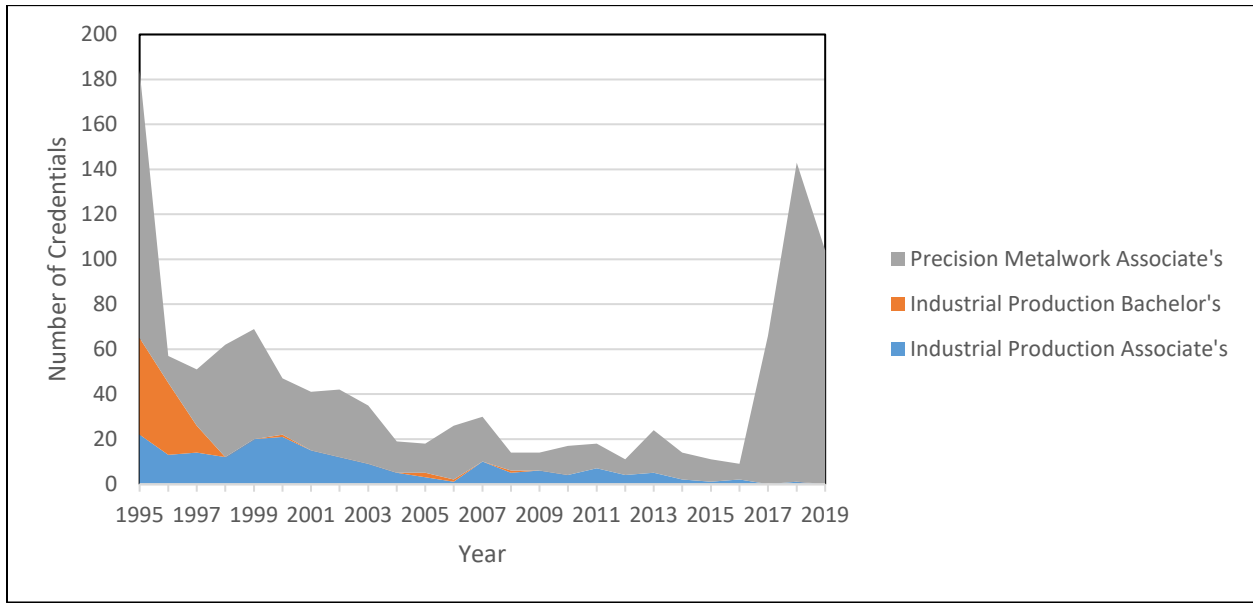
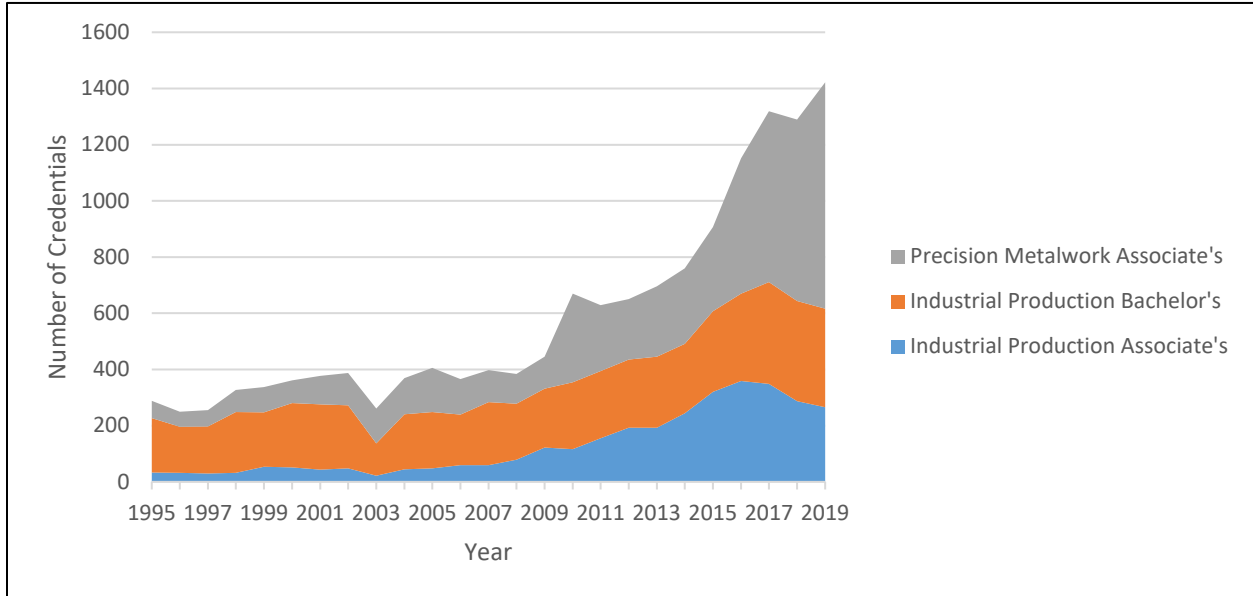


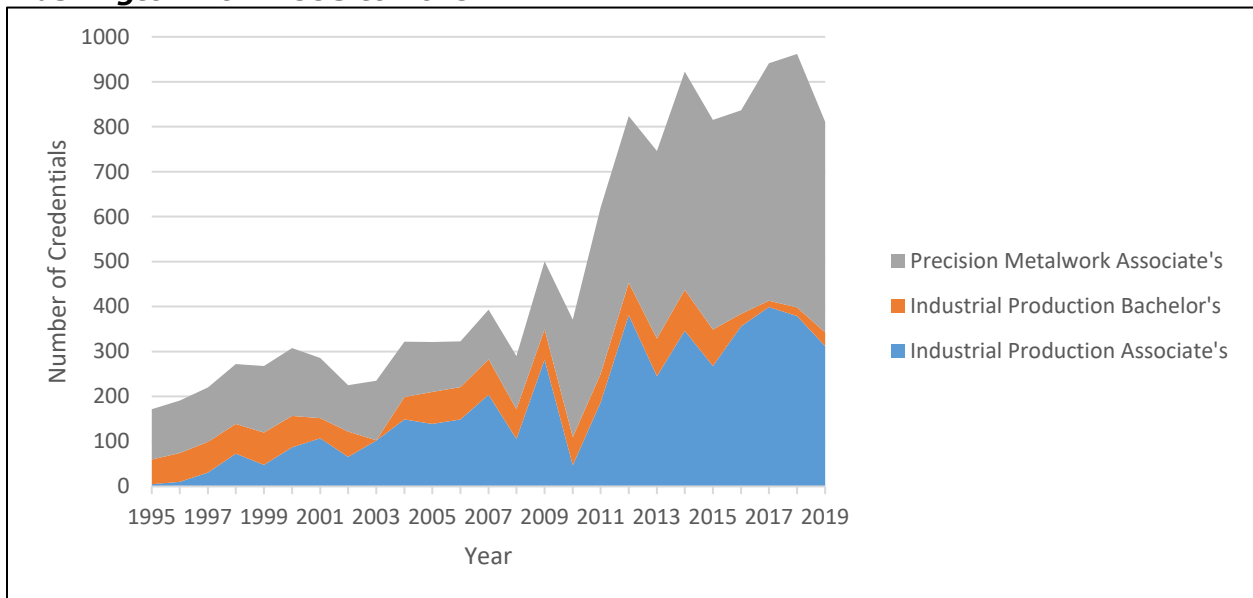
Figure 2 examines the same trends in the state of Florida. While Ohio demonstrated a marked stability in annual awards, Florida shows a more erratic pattern. After 1997, there were no bachelor’s degrees awarded in Industrial Production, and the number of associate’s degrees granted in that field fell from about 15 awards per year through 2002 to less than five per year thereafter, with only a handful awarded in total since 2015. Precision Metalwork degrees were far more common in the state. Though these associate’s degrees were awarded at an average of 34 per year across the majority of the timeframe of analysis, there were idiosyncratic bumps at the beginning (195 in 1995) and at the end (246 combined in 2018 and 2019) of the period.

Figure 3: Industrial Production and Precision Metalwork Degrees Awarded in Texas from 1995 to 2019



In Texas, we see another distinct pattern, one of growth across degree fields and levels. In industrial production, the annual number of bachelor’s degree awards was just over 200 from 1995 to 2014. That average increased to about 330 per year thereafter. Associate’s degrees in Industrial Production demonstrated much higher relative growth; 33 such degrees were awarded in 1995, compared with 79 in 2008, 155 in 2011, and 266 in 2019. The ratio of associate’s to bachelor’s degrees awarded in Industrial Production in Texas flipped in the course of the study period from 1:6 in 1995 to 4:3 in 2019. At the same time, the most dramatic increases in degree awards in Texas occurred in Precision Metalwork. Over the study period, the number of Precision Metalwork (associate’s) degrees grew from 61 in 1995, to 157 in 2005, and finally to over 800 in 2019.

Figure 4: Industrial Production and Precision Metalwork Degrees Awarded in Washington from 1995 to 2019



The final state we consider in this brief is Washington. Similar to Texas, we see remarkable overall growth in these fields of study. Unlike Texas, however, we do not see robust production of bachelor's degrees in Industrial Production; in fact, in the most recent years we see a notable decline of these awards, from a generally stable average of 50 to 70 awards per year until 2016 to 30 or fewer awards per year in the period since then. Meanwhile, associate's degree awards in the same field grew over that period – from less than 10 in 1995 to an average of over 300 per year since 2016 – and the number of associate's degrees awarded in Precision Metalwork rose from 112 in 1995 to an average of 503 per year since 2016.

Notable Patterns

These data describing degree awards in two manufacturing-related fields over time in four states suggest that each state may be responding to its own labor market needs (and/or those of neighboring states) while also working within the parameters of its postsecondary education system. In Texas, Ohio, and Washington, there was general consistency in the number of bachelor's degree awards over the period of analysis; signs of recent growth observed in Texas and decline observed in Washington were modest. Growth in these states' degree production tended to occur as a result of associate's degrees. Growth in the Precision Metalwork field of study (all associate's degrees) suggests that community colleges can be relatively responsive to local labor market trends. Growth in this field may also relate to the sorts of production happening in states. Both in the South (Florida) and the West (Texas and Washington, degree production has grown dramatically in this field since 2008.

Limitations

The IPEDS data that underlie this data tool rely on the Classification of Instructional Programs (CIP) coding scheme, which was intended to "assist in collecting, reporting, and interpreting data about instructional programs."² It is important to note that CIP data are compiled by individual institutions rather than by a centralized government entity, and as a result, different postsecondary institutions may use the codes in different ways. Similarly, uses of CIP codes within an institution may change over time as program content evolves. One reason CIP coding may change within technician programs, for example, is in response to changes in the federal government's designation of certain programs of study as eligible for Optional Practical Training (OPT) for F-1 Visa students.

Conclusion

This brief examined changes in the number and type of degrees awarded in two manufacturing fields of study – Industrial Production and Precision Metalwork – in four states – Ohio, Florida, Texas, and Washington. It showed that each state had a distinct pattern of growth and change in awarding credentials in these two fields of study. It also demonstrated the value of the Technician Graduates Data Tool, specifically its recent functionality improvements allowing for data download and manipulation.

² Malitz, Gerald. (1987). *A Classification of Instructional Programs (CIP)*. Washington, DC: Center for Education Statistics, Office of Educational Research and Improvement.

About the Author

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