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Stacking Educational Credentials in Ohio

Pathways Through Postsecondary Education in Health Care, Manufacturing and Engineering Technology, and Information Technology

State systems of higher education, as well as individual community colleges, universities, and technical or trade schools, are grappling with how they can adapt to support the rapidly evolving economy and labor markets while also serving an increasingly diverse population of individuals who are in need of flexible education and training opportunities (Austin

et al., 2012; Ganzglass, 2014). With more-flexible opportunities for earning credentials and more occupationally focused coursework than traditional degrees offer, stackable credential programs represent one potentially promising approach to addressing these challenges.

Stackable credentials are defined by the U.S. Department of Labor as a “sequence of credentials that can be accumulated over time to build up an individual’s qualifications and help that individual move along a career pathway to further education and different responsibilities, and potentially higher-paying jobs” (Employment and Training Administration, 2010, p. 6). In the postsecondary

KEY FINDINGS

- The number of students earning certificates in the health care and the manufacturing and engineering technology fields increased between 2005 and 2013, and the percentage of health care certificate-earners going on to stack additional credentials within two years increased by 50 percent.
- Despite being represented at higher percentages among certificate-earners relative to degree-earners, black students and adult learners (aged 25 or older) were less likely to stack additional credentials relative to white students and younger students.
- Among students who stacked one or more additional credentials within four years of completing a certificate, 71 percent had stacked to the associate’s degree level and 9 percent had stacked to the bachelor’s degree level.
- The majority of students who earned multiple credentials did so at the same postsecondary institution.
- Students who stacked both a certificate and an associate’s degree had accumulated an average of 17 additional credit hours and had enrolled for a little more than one additional term, on average, compared with students who had earned an associate’s degree only.

framework, stacked credentials consist of two or more occupation-specific educational credentials (i.e., certificates or degrees) that have been designed to share coursework within a sequenced progression or pathway (Wilson, 2016). With multiple entry and exit points, these stackable credential programs offer an alternative to students who might need to pursue nontraditional routes through education as they balance the demands of college with work and family obligations (Austin et al., 2012; Center for Occupational Research and Development, 2018; Wilson, 2016). Furthermore, initiatives around stackable credential programs have often emphasized the importance of building the programs so that they directly meet the needs of employers and map credentials to specific career opportunities (Austin et al., 2012; Center for Occupational Research and Development, 2018).

Ohio has been a leader in the expansion of stackable credential programs. The state legislature passed a series of bills in 2006 and 2007 that called for a statewide system of such credentials (Community Research Partners, 2008). These legislative efforts were followed by other initiatives at the local, state, and federal levels that supported the expansion of Ohio’s programs; such initiatives included statewide agreements to facilitate the transfer of credits across institutions and federal grants to develop stackable programs. Yet little is known about the degree to which students are completing stackable credential programs in Ohio, the pathways they are taking through education and employment, and whether these programs are achieving their intended outcomes. To build a better understanding of stackable

credential programs in Ohio and how they are serving students and employers in the state, the RAND Corporation partnered with the Ohio Department of Higher Education to examine education and employment data in three prominent fields: health care, manufacturing and engineering technology (MET), and information technology (IT).

In this report, we provide an initial descriptive look at student pathways through stackable credential programs in Ohio.¹ We identified students who first completed a certificate in our three fields of focus between 2005 and 2013 and then went on to “stack” (or earn) additional postsecondary education credentials. Focusing on this population of “stackers,” we examined who was completing stackable credential programs, what types of credentials students stacked, and how and where students were progressing through these programs. These descriptive findings can help provide insights into whether the completion of stackable credential programs in Ohio are aligned with their intended aims and identify areas for possible improvement.

The structure of this report is as follows: We first provide some background on stackable credentials, including a description of the policies and initiatives that have aimed to support their growth in Ohio and an overview of our three fields of focus. Next, we discuss the findings from our descriptive analysis. We conclude with some key takeaways for Ohio stakeholders and the broader field.

Background on Stackable Credentials

In recent decades, there has been substantial growth in the number of *middle-skill jobs*, defined as those requiring education levels greater than a high school diploma but less than a college degree (Graf, Fry, and Funk, 2018; Holzer, 2015). Middle-skill jobs are found across a wide variety of sectors and can be blue collar or white collar; examples include emergency medical technicians, IT specialists, and machinists. At the same time, the population of college enrollees has shifted, and many of the students enrolling in postsecondary education face substantial economic and time constraints (Radford, Cominole,

Abbreviations

HEI	Higher Education Information System
HVAC	heating, ventilation, and air conditioning
IT	information technology
MET	manufacturing and engineering technology
OTC	Ohio Technical Center
TAACCCT	Trade Adjustment Assistance Community College and Career Training

and Skomsvold, 2015). These students often require more-flexible postsecondary education options to accommodate work and family responsibilities while they are completing their coursework (Fong, Janzow, and Peck, 2016).

States and postsecondary institutions—including public institutions and private, for-profit institutions—have responded by expanding their career and technical education program offerings below the degree level, leading to a substantial increase in the attainment of postsecondary certificates. Over the past two decades, the number of certificates awarded in the United States each year increased by 71 percent, to nearly 1 million (National Center for Education Statistics, 2018). A national survey found that, between 1984 and 2009, the percentage of U.S. adults who held a postsecondary certificate as their highest educational credential grew from less than 2 percent to almost 12 percent (Carnevale, Rose, and Hanson, 2012), while another national survey found that approximately 8 percent of all U.S. adults held a postsecondary certificate in 2016 (Cronen, McQuiggan, and Isenberg, 2017). Certificate-earning individuals were more likely to have come from underrepresented racial and ethnic groups and were more likely to be economically disadvantaged (Carnevale, Rose, and Hanson, 2012; Cronen, McQuiggan, and Isenberg, 2017).

With the expansion of certificate programs, states and colleges began to consider how these programs might fit into the broader framework of postsecondary offerings and allow students to earn additional credentials. Given that employers may often (and increasingly) require new types of skills or different types of credentials as individuals progress in their careers, some students might be able to benefit from the opportunity to continue education beyond the attainment of an initial certificate. Stackable credentials provide a framework for integrating certificates and other types of credentials into a system that allows individuals to more gradually build up skill sets and earn credentials throughout a career.

Ideally, stackable certificate and degree programs are designed so that two or more credential programs include shared course requirements, allowing for simultaneous progress toward several credentials (Wilson, 2016). By streamlining and aligning

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requirements, programs may allow students to more easily build on the initial certificate programs they complete. Certificate programs also offer earlier off-ramps for degree-seeking students, which provides students who might otherwise have dropped out with shorter-term credentials and options for immediate career development. In other words, when educational pathways offer multiple on-ramps and off-ramps for students, the hope is that students can transition more easily from postsecondary education into labor force participation and back into postsecondary education, with opportunities to earn meaningful credentials along the way (Austin et al., 2012). On the other hand, some research has raised concerns that stackable credential initiatives may lead students—particularly low-income and minority students—to stop after obtaining short-term credentials when they otherwise would have earned degrees (Giani and Fox, 2017).

As research on stackable credential programs in California suggests, many programs have been built to encourage vertical or progressive stacking, with students earning higher-level credentials and developing deeper knowledge in a specific area (Bohn and McConville, 2018). Health IT programs

are one example: A student first earns certificates in medical coding or health IT to prepare and code medical records, followed by an associate's (and possibly a bachelor's) degree that builds on the initial coursework and trains students to take on the role of administering and managing health information systems. Many vertical pathways flip the experience of earning a degree relative to traditional degree programs; specifically, students learn most of their field-specific content in the first two years and conclude with general education coursework. Stackable credential programs can also be designed to encourage horizontal stacking, in which students are encouraged to earn two or more certificates to expand into other specializations or update knowledge (Ganzglass, 2014). As an example of a pathway that might encourage horizontal stacking, Bohn and McConville (2018) describe a short-term certificate program for energy technology fundamentals that then branches out into three different specialized certificates in various solar and energy efficiency specialties. Some pathways may encourage both horizontal and vertical stacking (e.g., lattice pathways).

These vertical and horizontal pathways of stackable credentials may be developed within a single institution or may span multiple institutions. To support stackable credential pathways that span multiple

institutions, states and institutions have developed articulation agreements guaranteeing transfer of credits from one institution's program to another, have co-designed programs, and have conferred on curricula and program requirements to ensure alignment (Ganzglass, 2014). Increasingly, policymakers are moving toward statewide transfer agreements in which postsecondary institutions are required to accept blocks of course credit for approved programs, aiming to support more-seamless stacking of credentials by students (Education Commission of the States, undated).

Although the sharing of credits and course requirements across more than one program is a core feature of stackable credentials, there are other promising practices for scaling these programs. For example, stackable credential initiatives often encourage institutions to develop tools for advising (e.g., pathway maps, career advice) and assessment (e.g., prior learning assessments, embedding professional exams) that facilitate smooth transitions between educational programs and between education and employment (Austin et al., 2012; Community Research Partners, 2008; Ganzglass, 2014; Center for Occupational Research and Development, 2018). To further strengthen the connections between educational programs and employers, high-quality stackable credential programs might use such strategies as mapping programs closely to in-demand job opportunities, soliciting input from employers on curricula, and offering opportunities for work-based learning (e.g., internships, apprenticeships) (Community Research Partners, 2008; Ganzglass, 2014).

Although the term *stackable credentials* has typically been used to refer to applied or technical fields that start with short-term educational certificates that articulate into other educational certificates and degrees at the undergraduate level (as we described earlier), some researchers have used the terminology to represent a somewhat broader set of credentials and patterns of stacking. For example, one study counted individuals who had earned associate's and bachelor's degrees as stacking credentials, regardless of whether students had first earned a short-term certificate (Leibert, 2017). Another study examined patterns of stacking that included cases in which a postsecondary degree had been earned prior to a

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certificate (e.g., Bailey and Belfield, 2017). And other studies emphasized the value of stacking *non-credit credentials*, such as industry certifications, micro-credentials, and certificates earned in high school or adult education programs (Austin et al., 2012; Ganzglass, 2014, Wilson, 2016). For the purposes of this report, we focused on the stacking of all education credentials awarded by Ohio public post-secondary institutions, which included credit-bearing certificates and degrees, as well as non-credit “clock-hour” certificates (described in more detail later). So, while we examine a critical portion of the stackable credential landscape in Ohio and the types of credentials that are most commonly described in the literature as stackable, our findings will not reflect all of the stacking that may be taking place under these broader definitions.

Several studies have examined student participation in certificate programs, many of which focused on employment outcomes for students completing certificates (e.g., Bahr et al., 2015; Belfield and Bailey, 2017; Stevens, Kurlaender, and Grosz, 2018; Xu and Trimble, 2016). The degree to which these credentials confer labor market value in terms of employment and earnings is an important signal of the degree to which they are benefiting individuals and employers. For example, Bettinger and Soliz (2016) found that Ohio health certificates led to increased earnings for the certificate-holders between 1999 and 2001, while other types of certificates were not associated with the same types of returns. Alongside evidence on labor market outcomes, these and other studies have demonstrated substantial growth in the completion of certificate programs (e.g., Carnevale, Rose, and Hanson, 2012).

Somewhat fewer studies have examined the stacking of multiple credentials and the ways in which students move through additional educational programs after completing a certificate. One study examined national data to document the degree to which multiple credentials are being completed and to examine employment outcomes for students who earned multiple credentials (Bailey and Belfield, 2017). Leibert (2017) documented the rates of stacking and labor market returns from stacking in Minnesota, although that study was focused largely on those who stacked a bachelor’s degree on

top of an associate’s degree. A series of studies have examined students who stacked multiple credentials at California community colleges; some of those reports examined stacking across all fields (Bohn and McConville, 2018; Bohn, Jackson, and McConville, 2019), while others examined stacking in health care fields (Bohn, McConville, and Gibson, 2016). And researchers have evaluated stackable credential programs supported by U.S. Department of Labor grants, documenting the implementation of these programs, student participation, and student outcomes (e.g., Giani and Fox, 2017; New Growth Group and Ohio Education Research Center, 2018). This study builds on this limited body of research by conducting a deep dive to examine stackable credential completion in Ohio.

The Case for Examining Stackable Credentials in Ohio

The public postsecondary education system in Ohio consists of 14 universities, 23 community colleges, and 53 Ohio Technical Centers (OTCs). Ohio’s postsecondary institutions enrolled approximately 515,000 students in fall 2018, offering students a wide variety of certificate and degree programs. All types of institutions have been encouraged to offer credentials below the degree level and develop stackable credential pathways. The OTCs offer a variety of adult education and workforce training programs that include *clock-hour technical certificates*, which generally prepare students to obtain third-party, industry-recognized certifications and licenses, allowing them to meet the occupational standards accepted in various career- and technical-based industries. Clock-hour certificates offered at OTCs do not immediately offer students college credit and thus are non-credit credentials, but they can often be converted into college credit under bilateral and statewide articulation agreements to allow for stacking with other credit-bearing post-secondary credentials. Some clock-hour and credit certificate programs are interchangeable in terms of length and content, and longer clock-hour programs (> 600 hours) are eligible for federal financial aid. Responsibility for OTC oversight was moved from the Ohio Department of Education to the Ohio

Department of Higher Education in 2009 to facilitate stronger integration with other postsecondary institutions. Community colleges and universities primarily offer credit-bearing certificates and degrees, although, in some cases, they have also developed non-credit, clock-hour technical certificate options.

Although Ohio is not alone in its efforts to scale stackable credentials—19 states had developed policies on funding and requirements for these programs as of 2016 (Wilson, 2016)—the state has certainly been a leader in the area. In 2006 and 2007, the Ohio General Assembly passed several pieces of legislation that called for a statewide system of stackable credentials.² The legislation left discretion to the Ohio Department of Higher Education for determining the structure and implementation of the system but called for this stackable credential system to

- (1) Be uniform across the state;
- (2) Be available from an array of providers, including adult career centers, institutions of higher education, and employers;
- (3) Be structured to respond to the expectations of both the workplace and higher education;
- (4) Be articulated in a way that ensures the most effective interconnection of competencies offered in specialized training programs;
- (5) Establish standards for earning pre-college certificates;
- (6) Establish transferability of pre-college certificates to college credit. (Ohio Revised Code, undated, Section 3333.34)

The legislation called for policies to facilitate the transfer of career and technical education credits “without unnecessary duplication or institutional barriers” (Section 3333.16) and specified that certificate programs should be designed to prepare participants to more successfully pursue additional postsecondary education, with a particular focus on ensuring that these programs serve low-income working adults (Community Research Partners, 2008).

This legislation played an important role in driving interest among policymakers and institutional leaders in developing stackable credentials, but later initiatives may have been more critical to

building an infrastructure for stackable credentials. With three different types of postsecondary institutions in the state that offered potentially stackable credentials—OTCs, community colleges, and universities—policies that facilitated cross-institution transfer were a priority. The state implemented several initiatives supporting the articulation of credits between institutions; examples include the One-Year Option initiative and the Career-Technical Credit Transfer Assurance Guides (CTAGs) that facilitated transfer from career-focused OTC programs to community college programs, as well as the Ohio Guaranteed Transfer Pathways initiative and the Transfer Assurance Guides (TAGs) that facilitated transfer from community colleges to universities. Our conversations with state policymakers suggest that the state also made changes to improve how certificates were defined, implemented, and reported in the data to ensure more standardization of program design and reporting.

In addition to Ohio efforts that built an infrastructure for stackable credentials, other Ohio policies may have provided incentives to scale these programs. For example, Ohio’s performance-based funding system—first used in 2012—may have shaped stackable credential programs by incentivizing colleges to award more credentials and different types of credentials. And in 2015, the state placed limits on allowable credits in associate’s degree programs, which may have encouraged institutions to streamline degree programs.

Beyond these state-led efforts, various federal initiatives have played an important role in supporting the expansion of stackable credential programs. The U.S. Department of Labor has intensely focused on expanding the number of students earning credentials, leveraging such programs as Career Pathways, the Workforce Investment Act, the National Emergency Acts, and Trade Adjustment Assistance to provide funding and guidance to states and institutions (Employment and Training Administration, 2010). For example, between 2010 and 2014, the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program provided 14 institutions in Ohio with grants totaling more than \$55 million to build stackable credentials in manufacturing, health

care, IT, and transportation. Beyond supporting the development of programs in individual community colleges, these grants have supported the creation of consortia of colleges and employers focused on developing stackable credentials; examples include Ohio TechNet (focused on manufacturing credentials) and ShaleNet (focused on oil and gas credentials) (New Growth Group and Ohio Education Research Center, 2018; Gonzalez et al., 2019).

Given the many initiatives underway related to stackable credentials, the Ohio Department of Education was interested in understanding the degree to which students were completing multiple credentials over time and across fields (i.e., stacking). For example, has completion of multiple credentials increased since these various policies were enacted? Is the system of stackable credentials meeting the standards set out by legislation, such as allowing for stacking across different types of institutions and avoiding unnecessary duplication of coursework? With the descriptive analysis presented in this report, we aim to provide some initial evidence that can help policymakers and institutions understand how the state's system of stackable credentials is functioning.

The Case for Examining the Health Care, Manufacturing and Engineering Technology, and Information Technology Fields

We decided to focus on the fields of health care, MET,³ and IT for several reasons. First, these fields have garnered state and federal attention because of their important role in the U.S. economy. According to the Bureau of Labor Statistics, health care is the largest employment sector in the U.S. economy, accounting for 12 percent of all U.S. jobs in 2018 and projected to grow to nearly 14 percent of jobs by 2028 (Bureau of Labor Statistics, 2019b). This sector is particularly important in Ohio, which has an increasingly aging population (Kunkel et al., 2019). Manufacturing, on the other hand, has experienced a loss of more than 700,000 jobs since 2008 (Bureau of Labor Statistics, 2019b) but has been a focus of federal and state attention across the United States, given its importance to maintaining U.S. competitiveness and

Fields with a large proportion of jobs falling at middle-skill levels may be particularly suitable for stackable credential programs.

its critical role in providing critical middle-class jobs (Burrowes et al., undated). Although macroeconomic factors have contributed to the lower domestic demand for manufacturing workers, attrition from the manufacturing workforce and the changing technical skills required to work in MET fields have created new opportunities for workers and a need for postsecondary institutions to expand program offerings. IT occupations also provide valuable opportunities for U.S. workers, and such jobs are expected to grow 12 percent by 2028 (Bureau of Labor Statistics, 2019a). With the economy increasingly reliant on advanced network systems, information-sharing, data science, and digital technology, ensuring that Ohio has a steady stream of trained IT workers is imperative if state leaders hope to support and sustain economic growth.

Fields with a large proportion of jobs falling at middle-skill levels may be particularly suitable for stackable credential programs. Jobs in health care, MET, and IT are among the most common to require a certificate for entry (Torpey, 2018) and among the top fields in which certificates are awarded (Carnevale, Rose, and Hanson, 2012). Furthermore, studies have found that earning short-term credentials in these three fields can lead to improved earnings (Bahr et al., 2015; Bailey and Belfield, 2017; Bettinger and Soliz, 2016; Bohn, Jackson, and McConville, 2019). So, while our examination of these three fields cannot be generalized to represent all stackable credential attainment in Ohio, the fields account for a large proportion of all stackable

credential pathways and those most likely to provide benefits to students.

We were also interested in examining variation across these three fields because the design of stackable credential programs and patterns of student participation may look quite different from field to field. As noted earlier, current rates of growth in the employment sector vary across fields, which may influence the demand for credentials at all levels within a field. In addition, the skill requirements may vary across fields. For example, although some fields may be more likely to require degrees and will therefore benefit from vertical pathways, other fields require workers to develop different specializations and may emphasize horizontal pathways more. Differences in workforce demand and skill requirements can translate into different labor market returns for individuals, who may be more likely to pursue fields and credentials that lead to better earnings. For example, studies of Ohio and national data show higher returns for certificates in health care relative to other fields (Bailey and Belfield, 2017; Bettinger and Soliz, 2016). There may also be variation in the degree to which industry associations and employers have encouraged and supported the expansion of stackable credentials across fields. For

example, health care organizations were early to the stackable credential movement; such initiatives as the push to rapidly increase nurses' credentials to the bachelor's degree level helped drive efforts to scale stackable credential opportunities (e.g., Spencer, 2008). The manufacturing industry has also played a major role in advocating for stackable credentials, and the National Association of Manufacturing established its own recognized system of stackable credentials (Austin et al., 2012). Understanding more about the patterns in each of these fields may help Ohio leaders better understand the unique pipelines in each field and thus how to better target efforts to support stackable credential programs.

The Scope of This Report

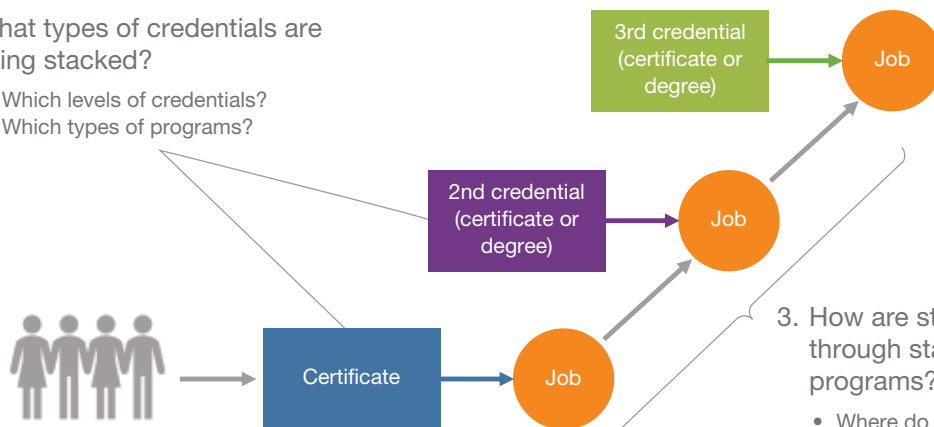
In this report, we examine questions in three areas to explore whether Ohio's system of stackable credentials is meeting the goals set out by policymakers and to build additional evidence on patterns of participation and progress in common stackable credential fields (Figure 1).

First, we were interested in understanding more about who is completing stackable credentials. Given the strong emphasis on scaling stackable credentials

FIGURE 1
Key Questions We Examined in This Report

2. What types of credentials are being stacked?

- Which levels of credentials?
- Which types of programs?



1. Who is stacking credentials?

- Have completions of certificates and stacking increased over time?
- What types of students complete certificates and stackable credentials?

3. How are students progressing through stackable credential programs?

- Where do students earn their first credential?
- Do students earn additional credentials at the same institution or different institutions?
- Do stackers have excess credit hours and more terms of enrollment?

in Ohio since 2006, one would expect to see growth in the number of students completing certificates and stacking credentials over time. It was also critical for us to examine the types of students completing stackable credential programs in order to determine whether the more flexible pathways and greater opportunities to mix employment and education in stackable credential programs might have helped populations that have historically been underrepresented (i.e., minority racial and ethnic groups) and *adult learners* (defined as individuals aged 25 or older) attain credentials.

Next, we examined which types of credentials are earned by stackers, including the levels of credentials stacked and the types of programs or subfields students are stacking credentials in. Understanding more about which credentials are being stacked may shed some light on how institutions have designed these pathways and the degree to which different types of pathways are being successfully completed. For example, if students are primarily stacking multiple certificates, it suggests that institutions may have offered pathways that facilitate horizontal stacking. If stacking is disproportionately concentrated in a few subfields, institutions and the state may want to explore what is driving differences across fields as programs are scaled and ensure that these patterns align with workforce needs. And even if the current set of programs and levels of credentials being stacked is optimal, the state might consider tailoring policies and directing resources more efficiently to the fields where stacking is taking place.

Finally, we explored student progress through these credential programs. Ohio policy called for all institutions in the state to develop stackable credential programs, and the state has invested heavily in articulation agreements. As a result, we would hope to see program offerings across all types of institutions and to see students stacking across institutions. In addition, we were interested in understanding the degree to which students might be accumulating additional credits and enrolling for additional terms to earn their credentials. Ohio policy calls for stackable credential pathways that align programs as much as possible, and one of the central benefits offered by stackable credentials is the ability for students to progress toward multiple credentials without

unnecessary duplication of coursework. Policies and programs that reduce the amount of time and number of credit hours required to earn a certificate or degree are of interest because they have the potential to cut costs for states and students (Kramer, Holcomb, and Kelchen, 2018). If students who are stacking credentials are not saving time or credit hours as they progress through their programs, it may shed light on the degree to which these programs are truly designed to be stackable, as well as the improvements needed to ensure that students can complete credentials with fewer credits and less time (i.e., more efficiently).

To examine these questions, we drew on statewide administrative data from the Ohio Longitudinal Data Archive to track enrollment and completion across all of the public postsecondary institutions in Ohio, including OTCs, community colleges, and universities.⁴ As described earlier, many studies focus on the short-term educational certificate as a core component of stackable credential pathways, and Ohio was interested in pathways that started with short-term credentials below the degree level. We therefore started by identifying students who earned a short-term (undergraduate) postsecondary education certificate between 2005 and 2013 in our three fields of interest—health care, MET, and IT. We then followed those students for two to four years to determine how many went on to become stackers (students

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who earned an additional certificate or degree). After identifying stackers, we conducted descriptive analysis to address the questions outlined in Figure 1. An online technical appendix that accompanies this report (available at www.rand.org/t/RRA136-1) provides additional details on our analytic approach and supplementary findings.⁵

There were four key limitations to the analysis presented in this report that readers should keep in mind when interpreting our results. First, we may be missing some stacking, because we cannot observe stacking that occurs at private institutions or out-of-state institutions, so we may be understating the degree to which certificate-earning students stacked credentials. In addition, because we are examining data only through the 2014–2015 academic year, we are unable to assess progress with stackable credential participation and progress that occurred in response to policies and initiatives that were rolled out in Ohio in more-recent years. Third, although we examined students who we observed in the data as having stacked multiple credentials, that does not necessarily imply that all of these students enrolled in programs that were explicitly designed to be stackable. Some students may have participated in programs that were designed to neatly articulate, and others may have stacked credentials in programs that were designed separately without consideration for stacking, but there were no indicators in administrative data to identify programs that were designed to be stackable. And finally, because we conducted descriptive analysis, we are unable to speak to whether the patterns we observe reflect causal relationships. For example, we cannot disentangle (1) growth in stackable credentials that was due to state policy and institutional efforts and (2) patterns in postsecondary participation that were driven by economic factors, such as the Great Recession, and we cannot point to what was driving different rates of stacking among student subgroups. In future reports, we will aim to address some of these limitations by adding additional years of data, examining patterns of completion for programs that were and were not designed to be stackable, and employing quasi-experimental methods of analysis.

In the next section, we present findings in each of our three areas of inquiry. We then follow with a

discussion of what might be driving these patterns and what additional types of exploration might be needed to fully understand the stackable credential landscape in Ohio.

Findings

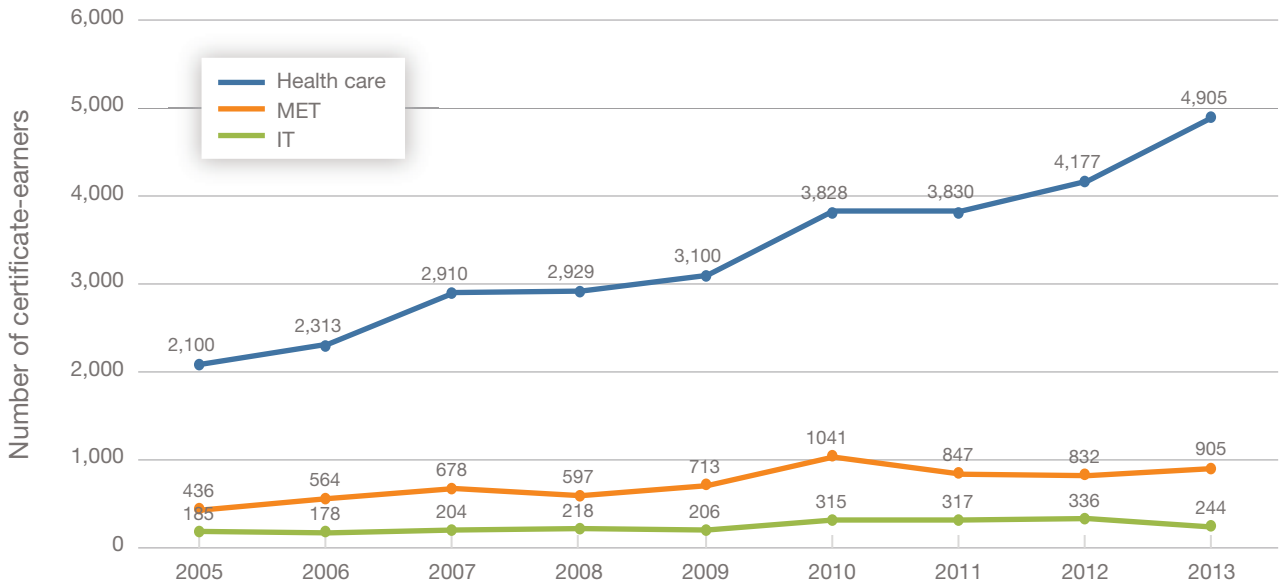
Who Is Stacking Credentials?

Earning an initial certificate is often a first step to stacking credentials at the postsecondary level. Given the attention Ohio has placed on expanding certificate and stackable credential programs and the national increases in certificate completion, we expected to see an increase in certificate earning at Ohio institutions. Overall, the state saw major growth in certificates awarded (a 150-percent increase between 2005 and 2015), compared with increases of 44 percent for associate’s degrees and 26 percent for bachelor’s degrees over the same period (see Table A.1 in the online appendix). It is important to note that the period we examined includes the Great Recession, and states across the country experienced increased levels of postsecondary enrollment during this time. In addition, unemployed individuals looking to develop skills for jobs may have disproportionately been drawn to short-term credentials, so it is unlikely that state policies and institutional efforts were entirely responsible for the trends observed during this period.

When we examined students who first earned a certificate in our three fields between the 2004–2005 and 2012–2013 academic years, we found that the number of certificate-earners doubled in health care and MET fields (Figure 2). We did not, however, observe similar increases in certificates earned in IT. It is also notable that health care fields accounted for the largest number of first-time certificate-earners, constituting more than 80 percent of all certificates completed across the three fields in 2013.

We then narrowed our focus to first-time certificate-earners who went on to earn a second credential, and this group represents our population of stackers. We found that rates of stacking varied substantially by field (Figure 3). Among students who first earned an IT certificate in the 2012–2013 academic year, more than half went on to earn a second

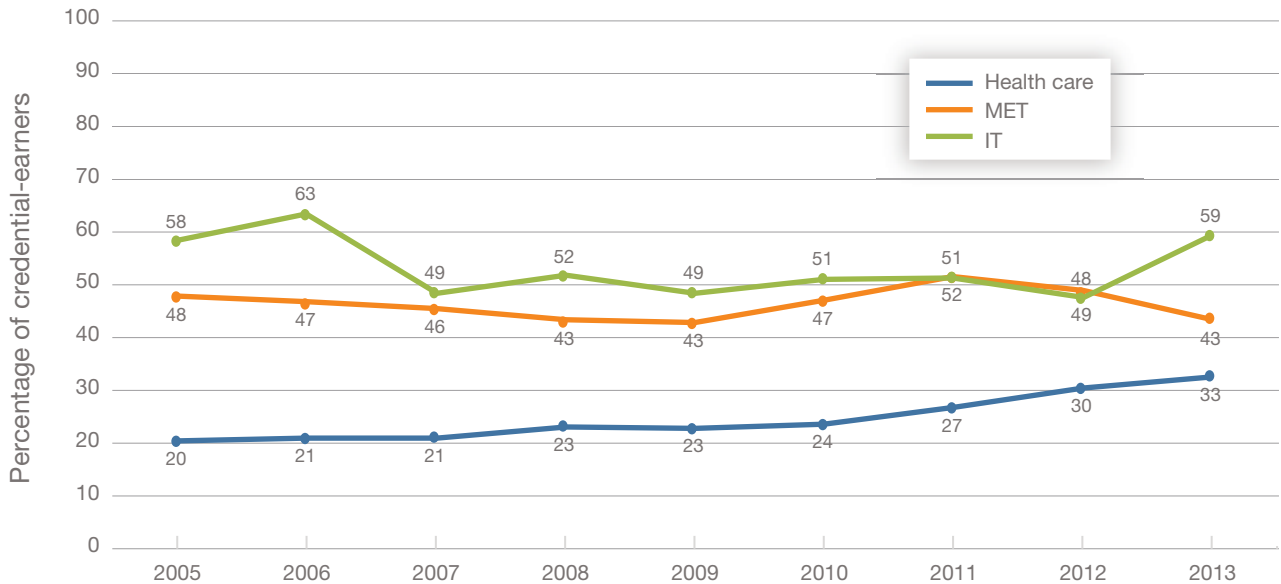
FIGURE 2
Number of First-Time Certificate-Earners, by Field



SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The figure presents the number of individuals who earned an initial certificate in each of the three fields between 2005 and 2013. In this figure and other figures throughout the report, the years represent the academic year ending in the year listed (i.e., 2005 is academic year 2004–2005).

FIGURE 3
Percentage of First-Time Certificate-Earners Who Stacked One or More Additional Credentials Within Two Years, by Field



SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The figure presents the percentage of individuals who earned an initial certificate in each of the three fields between 2005 and 2013 and then earned one or more additional credentials within two years. Calculations are based on the numbers of first-time certificate-earners identified in Figure 2 for each year and field.

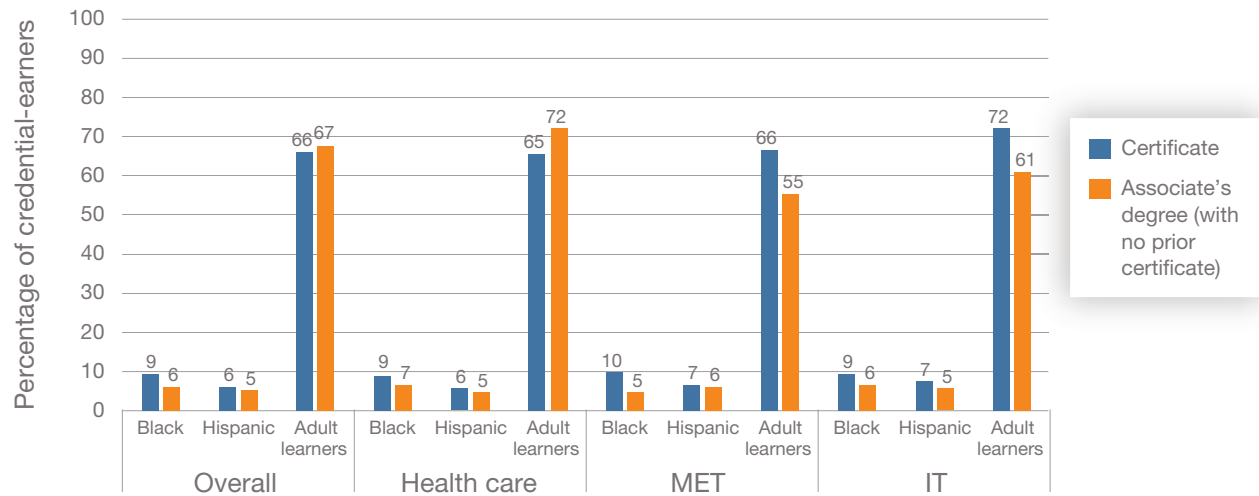
credential. Rates of stacking among MET and health care certificate-earners in 2012–2013 were somewhat lower, at 43 percent and 33 percent, respectively. Yet, given the larger overall population of health care certificate-earners in 2012–2013, the total number of stackers among this cohort was higher in health care ($N = 1,604$) than in MET ($N = 392$) or IT ($N = 145$). We found similar patterns across fields when following students four years after the first certificate (see Figure A.2 in the online appendix).

When examining trends over time, we saw substantial growth in the percentage of health care certificate-earners going on to earn a second credential within two years, from 20 percent of all certificate-earners in 2005 ($N = 429$) to 33 percent of certificate-earners in 2013 ($N = 1,604$). However, we did not observe similar increases in rates of stacking among MET and IT certificate-earners. This suggests that labor market demands for stackable credentials and efforts to encourage stacking of credentials

during this period may have been more prominent in the health care field than in the MET and IT fields. It may also be that some of Ohio’s initiatives to scale stackable credential programs in MET and IT did not take hold until after 2013, and we were unable to observe this more recent growth because of our focus on older data.

Given that one of the key aims of certificate programs and stackable credential programs is to broaden access to postsecondary education for populations of students that may not have been as well served by traditional programs—such as students from minority racial and ethnic groups and adult learners—we might expect to see larger numbers of individuals from these groups who completed certificate programs and stacked credentials. We first examined the degree to which these traditionally underserved groups completed certificate programs relative to degree programs. Figure 4 shows that black students accounted for 9 percent of

FIGURE 4
Percentage of Certificate-Earners and Associate’s Degree–Earners in Traditionally Underrepresented Subgroups, by Field



SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: We examined two groups of students who completed credentials between 2005 and 2013: students who earned a certificate and students who earned an associate’s degree without first earning a certificate. For each of these two groups, the figure presents the percentages of students falling into three traditionally underrepresented subgroups: black students, Hispanic students, and adult learners. We determined each student’s age group according to age at the time the individual earned his or her first certificate or associate’s degree. Certificate calculations are based on the following numbers of certificate-earners, by field: 30,092 (health care), 6,613 (MET), and 2,203 (IT). Associate’s degree calculations are based on the following numbers of associate’s degree-earners, by field: 62,958 (health care), 17,561 (MET), and 8,042 (IT).

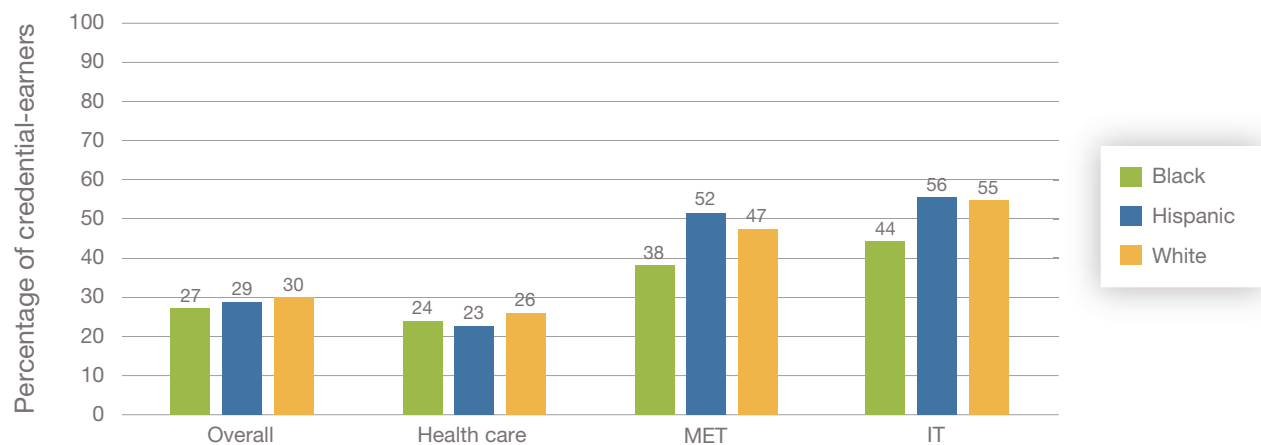
all certificate-earners and 6 percent of students who earned an associate’s degree without first earning a certificate. The representation of Hispanic students in each group was not notably different. Adult learners accounted for a large majority of both students who completed a certificate and students who went straight to an associate’s degree. In the MET and IT fields, the percentage of adult learners was higher among certificate-earners than among students who completed an associate’s degree without a certificate, and the opposite was observed in the health care field.

Although bringing more-diverse populations of students into certificate programs can help address postsecondary achievement gaps, encouraging equal or higher rates of stacking among under-represented groups may be essential to closing gaps at the degree level. Yet we found that black

students who earned a certificate were less likely to earn additional certificates or degrees within two years than certificate-earners from other racial and ethnic groups were—a pattern that was consistent across all fields except health care, where black certificate-earners stacked at roughly the same rate as Hispanic certificate-earners (Figure 5). Later, we examine variation in rates of stacking depending on which type of institution a student starts at and differences in student populations across institution types as possible explanations for lower rates of stacking among black certificate-earners and adult learners.

We also examined rates of stacking for adult learners (those aged 25 or older) relative to younger learners (Figure 6). Results indicate that adult learners who earned a first-time certificate were less likely to earn additional credentials.

FIGURE 5
Percentage of First-Time Certificate-Earners Who Stacked One or More Additional Credentials Within Two Years, by Field and Race/Ethnicity

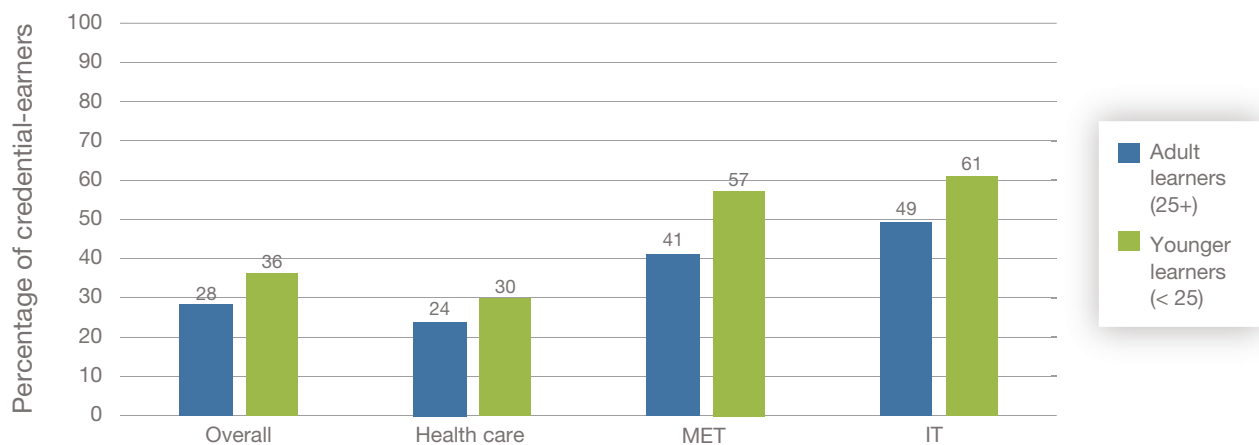


SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The figure presents the percentage of individuals who earned an initial certificate in each of the three fields and overall (three fields combined) between 2005 and 2013 and then earned one or more additional credentials within two years. We display the results for three race/ethnicity groups (black, Hispanic, and white). Calculations are based on the following numbers of first-time certificate-earners, by field and race/ethnicity: 2,604 (health care, black), 551 (health care, Hispanic), 23,424 (health care, white), 605 (MET, black), 130 (MET, Hispanic), 5,030 (MET, white), 186 (IT, black), 36 (IT, Hispanic), and 1,616 (IT, white).

FIGURE 6

Percentage of First-Time Certificate-Earners Who Stacked One or More Additional Credentials Within Two Years, by Field and Age Group



SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The figure presents the percentage of individuals who earned an initial certificate in each of the three fields and overall (three fields combined) between 2005 and 2013 and then earned one or more additional credentials within two years. We display the results for two age groups (adult learners aged 25 or older and younger learners). Calculations are based on the following numbers of first-time certificate-earners, by field and age group: 19,671 (health care, aged 25+), 10,421 (health care, aged < 25), 4,390 (MET, aged 25+), 2,223 (MET, aged < 25), 1,578 (IT, aged 25+), and 625 (IT, aged < 25).

What Types of Credentials Are Being Stacked?

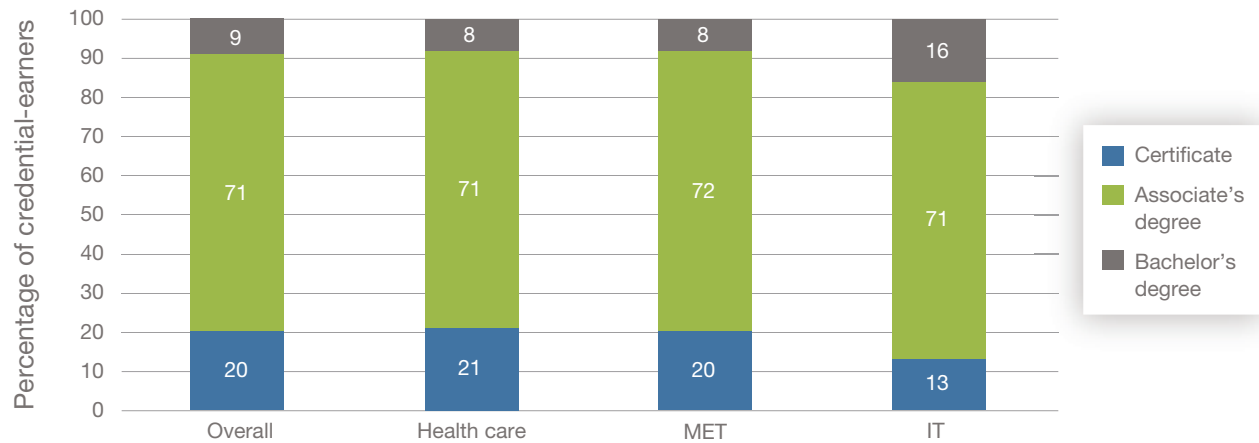
As described earlier, there are several options for how institutions might build stackable credential programs, and it is important to understand which types of credentials are being earned among students who stack. Some programs may encourage students to stack vertically, while others may facilitate horizontal stacking, with the aim of providing multiple certificate-level credentials in varying specialty areas. We followed individuals who stacked credentials within four years of earning an initial certificate and examined the highest level of credential earned (Figure 7).⁶ Across all fields, the majority of students who had stacked credentials had done so to the associate’s degree level. There were small differences by field: health care students were most likely to stack to the certificate level, and IT students were most likely to stack to the bachelor’s degree level. This suggests that most of the stackable credential

pathways offered in the three fields provided opportunities for vertical stacking.

To get a better sense of the types of stackable credential programs students are enrolling in, we next turned to examining the most-common subfields in which students earned credentials across fields and credential levels. Table 1 lists the top five subfields at the certificate and associate’s degree levels and the percentage of all stackers who earned credentials in these subfields. Less than half of all health care and MET stackers earned certificates in the top five most-common subfields, compared with 65 percent of all stackers who earned certificates in the top five IT subfields. This suggests that stacking may have been spread across a broader number of health care and MET fields relative to IT fields. In addition, associate’s degrees earned in health care appear to have been concentrated in a smaller number of subfields relative to certificates. This makes sense because multiple certificates sometimes lead into a single, more-general associate’s degree program, and

FIGURE 7

Percentage Distribution of the Highest Level of Credential Earned, Among Individuals Who Stacked One or More Credentials Within Four Years, by Field



SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The figure presents the percentage distribution of the highest level of credential earned (another certificate, an associate's degree, or a bachelor's degree) among individuals who earned an initial certificate in each of the three fields and overall (three fields combined) between 2005 and 2011 and then earned one or more additional credentials within four years. Calculations are based on the following numbers of first-time certificate-earners, by field: 6,412 (health care), 2,444 (MET), and 937 (IT).

some stackable credential programs may not have been designed to stack to the associate's degree level. However, for the MET and IT fields, the concentration of credentials in the top 5 subfields appeared to be about the same in both the associate's degree and the certificate levels.

In health care, nursing and fields related to patient care accounted for most of the top certificate and degree programs completed by stackers. Health information and administration fields were also represented among top programs. Of the top subfields in MET, engineering technology fields dominated, and welding was the only subfield that is often classified under manufacturing. Automotive engineering technology credentials were the most commonly earned at both the certificate and associate's degree levels, accounting for more than one-fifth of all MET stackers. Electrical engineering, HVAC, and construction were also represented among the top five programs at both levels. In IT, computer systems networking was

the most common certificate earned and was also found among the top five programs at the associate's degree level. However, the most common associate's degree earned among stackers was a general computer and information sciences degree.

Overall, we found that a substantial percentage of first-time certificate-earners across the three fields who earned additional credentials within four years did so outside of their initial certificate fields, and this was particularly the case for those who earned certificates in IT (Figure 8). Furthermore, certificate-earners in several of the top five subfields in Table 1 later went on to stack credentials in other fields. For example, more than 7 percent of health care certificate-earners went on to get an associate's degree in liberal arts and sciences/liberal studies, and 5 percent of IT certificate-earners went on to get an associate's degree in administrative assistant and secretarial science (a general business field not typically classified as IT).

TABLE 1

Five Most-Common Subfields for Stackers at the Certificate and Associate's Degree Levels

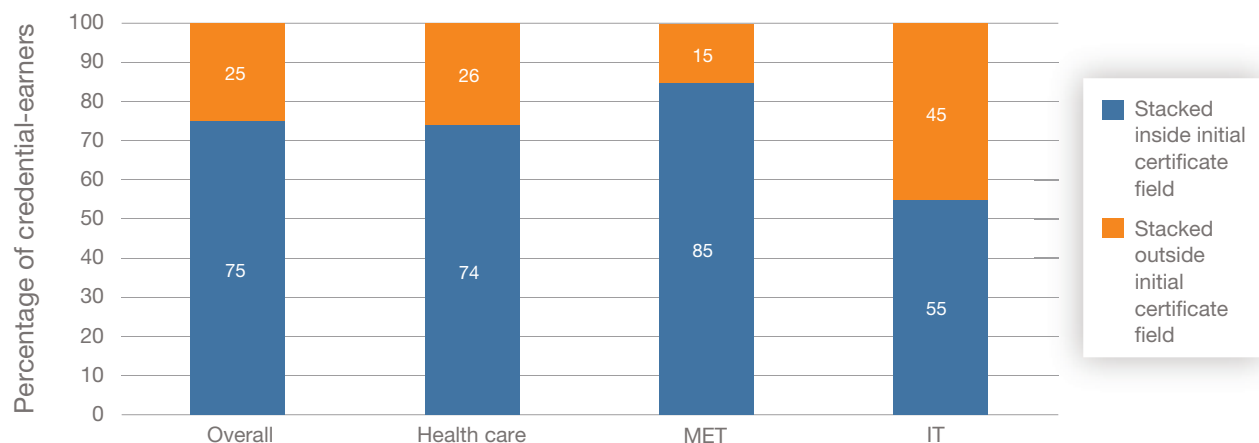
Certificate Program		Associate's Degree Program	
Subfield	Percentage of Stackers	Subfield	Percentage of Stackers
Health care			
Licensed practical/vocational nurse training	16.3	Registered nursing/registered nurse	27.9
Emergency medical technology/technician	12.8	Medical/clinical assistant	12.1
Medical/clinical assistant	6.9	Liberal arts and sciences/liberal studies	7.4
Nursing assistant/aide and patient care assistant	5.7	Emergency medical technology/technician	5.3
Emergency care attendant	4.8	Medical administrative/executive assistant	4.8
Total across top 5 subfields	46.5	Total across top 5 subfields	57.4
MET			
Automotive engineering technology	22.1	Automotive engineering technology	23.9
Welding technology/welder	8.2	Electrical, electronic, and communication engineering technology	9.6
Electronic and communication engineering technology	6.9	Construction engineering technology	5.9
HVAC and refrigeration engineering technology	6.3	Mechanical engineering technology	5.7
Construction engineering technology	5.2	HVAC and refrigeration engineering technology	4.0
Total across top 5 subfields	48.8	Total across top 5 subfields	49.0
IT			
Computer systems networking and telecommunications	29.1	Computer and information sciences, general	28.6
Computer programming, specific applications	10.8	Computer programming, specific applications	17.5
Computer and information systems security	9.3	Computer systems networking and telecommunications	10.7
Computer and information sciences support services	9.0	Administrative assistant and secretarial science	5.0
Computer and information sciences, general	6.8	Computer programming, general	4.0
Total across top 5 subfields	65.0	Total across top 5 subfields	65.9

SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: This table displays the top five subfields of study in each field at the certificate and associate's degree levels among students who stacked credentials. Certificate and associate's degree credentials are counted regardless of whether they were the first, second, or later credential earned in a stack. Values represent the percentages of stackers within the field who earned a certificate or associate's degree in each subfield. Percentages may not sum exactly because of rounding. Calculations are based on the following numbers of credential-earners, by field and credential type: 7,717 (health care, certificate), 5,278 (health care, associate's degree), 3,075 (MET, certificate), 2,318 (MET, associate's degree), 1,162 (IT, certificate), and 999 (IT, associate's degree).

FIGURE 8

Percentage Distribution of Stacking Inside or Outside the Initial Field, Among Individuals Who Stacked One or More Credentials Within Four Years, by Field



SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The figure presents the percentage distribution of stacking inside or outside the initial field among individuals who earned an initial certificate in one of the three fields and overall (three fields combined) between 2005 and 2011 and then earned one or more additional credentials within four years. Calculations are based on the following numbers of first-time certificate-earners who went on to earn additional credentials within four years, by field: 6,412 (health care), 2,444 (MET), and 937 (IT).

How Are Students Progressing Through Stackable Credential Programs?

In this section, we examine where students earned various credentials, the length of enrollment required to earn those credentials, and the credit hours accumulated in earning those credentials.

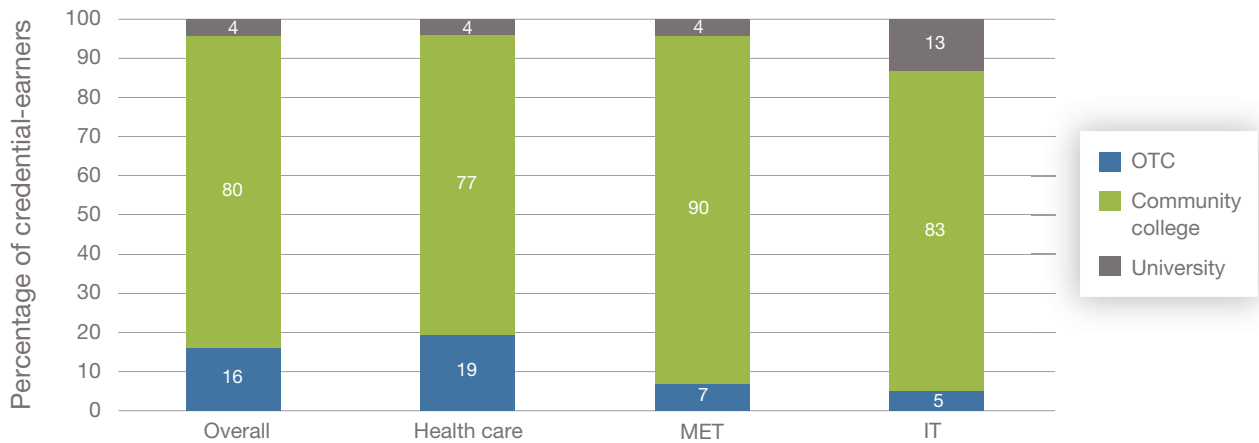
As noted previously, we anticipated that the bulk of certificate programs would have been offered at OTCs and community colleges, but Ohio legislation also encouraged universities to offer certificates. To provide a look at where students started their paths to stacking credentials, Figure 9 shows the types of institutions where students earned their initial certificates. We found that initial certificates were most commonly earned at community colleges, which accounted for 80 percent of all first-time certificate-earners across the three fields. OTCs also played an important role, accounting for 16 percent of all first-time certificate-earners. Universities represented a relatively small percentage of first-time certificate-earners.

We were also interested in understanding whether students might have been more or less likely to stack credentials if they started at certain types of institutions. The results, shown in Figure 10, suggest that students who earned a certificate at a community college or university were more likely to later earn additional credentials than were their peers who first earned a certificate at an OTC. However, relatively few students earned certificates at universities (Figure 9), so the overall number of students stacking at community colleges was still much larger than the number of students stacking at universities.

We also examined the demographics of first-time certificate-earners and stackers by the type of institution at which the initial certificate was earned. One possible explanation for lower rates of stacking among black students and adult learners (compared with white students and younger learners), as shown in Figures 5 and 6, is that these students may have been more likely to attend OTCs, where rates of stacking are lower than at other types of institutions. However, as shown in Table A.2 in the

FIGURE 9

Percentage Distribution of the Type of Institution at Which the Initial Certificate Was Earned, Among First-Time Certificate-Earners, by Field

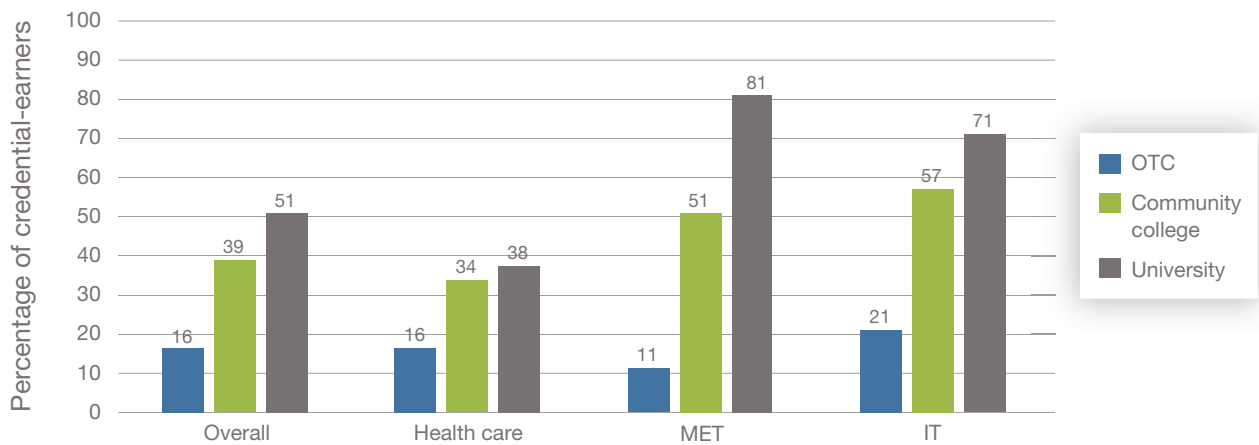


SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The figure presents the percentage distribution of the highest level of credential earned (another certificate, an associate's degree, or a bachelor's degree) among individuals who earned an initial certificate in each of the three fields and overall (three fields combined) between 2005 and 2011 and then earned one or more additional credentials within four years. Calculations are based on the following numbers of first-time certificate-earners, by field: 30,092 (health care), 6,613 (MET), and 2,203 (IT).

FIGURE 10

Percentage of First-Time Certificate-Earners Who Stacked One or More Additional Credentials Within Four Years, by Field and Type of Institution at Which the Initial Certificate Was Earned



SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The figure presents the percentage of individuals who earned an initial certificate in each of the three fields and overall (three fields combined) between 2005 and 2011 and then earned one or more additional credentials within four years. We display the results for three types of institutions (OTC, community college, and university). Calculations are based on the following numbers of first-time certificate-earners, by field and institution type: 4,086 (health care, OTC), 16,179 (health care, community college), 745 (health care, university), 274 (MET, OTC), 4,440 (MET, community college), 162 (MET, university), 71 (IT, OTC), 1,318 (IT, community college), and 234 (IT, university).

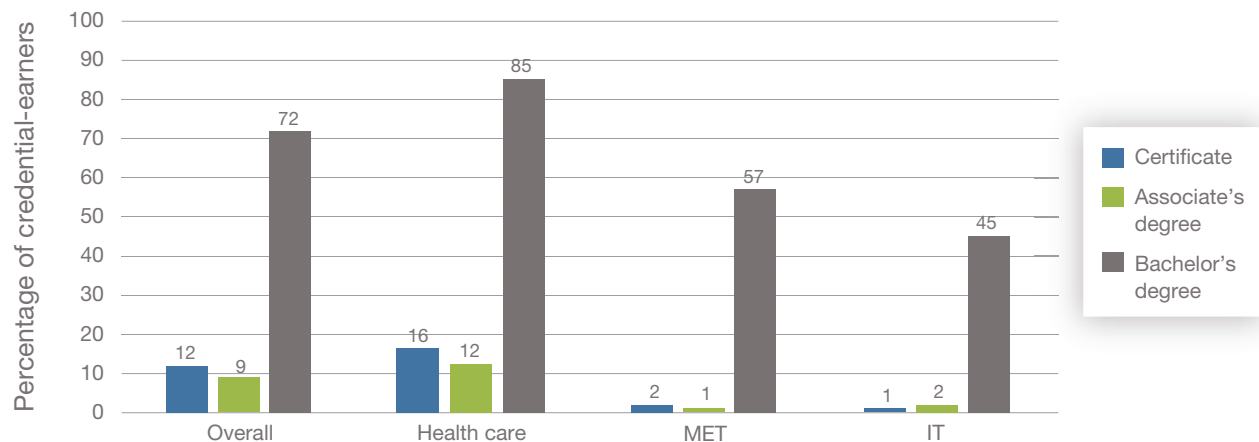
online appendix, we found greater representation of non-white students and adult learners among certificate-earners and stackers at community colleges and universities relative to OTCs. These patterns varied somewhat by field, but the MET field was the only one in which non-white students were represented at higher rates among first-time certificate-earners and stackers starting at OTCs than they were among first-time certificate-earners and stackers starting at community colleges and universities.

In many cases, individual OTCs, community colleges, and universities have built pathways of stackable credential programs that are self-contained within each institution, but Ohio also has in place several transfer initiatives that facilitate cross-institution stacking. Figure 11 indicates that most students who stacked to the certificate and associate's degree levels (the vast majority of stackers) attended a single institution. It was more common for students stacking to the bachelor's degree level to attend multiple institutions. This makes sense because most of the stackers in our sample started at OTCs and community colleges that did not offer

bachelor's degree programs. There was some variation by field, and health care students at all levels were more likely to attend multiple institutions in order to stack credentials.

To more deeply investigate how stackers were moving across institutions, we mapped the types of institutions where students earned their initial certificates and the types of institutions where they earned their highest level of credentials within four years (Figure 12). We found that, among students who first earned a certificate at a community college and went on to earn an additional credential, the vast majority did so at a community college (the same college or a different community college), although some transferred to a university and a smaller number transferred to an OTC. University certificate-earners largely remained at a university, with relatively few moving to another type of institution. Among students who earned an initial certificate at an OTC and went on to stack credentials, most eventually transferred to a community college or university, although some remained at an OTC and earned additional clock-hour certificates.

FIGURE 11
Percentage of Stackers Who Earned One or More Credentials at a Different Institution Within Four Years, by Field and Highest Level of Credential Earned

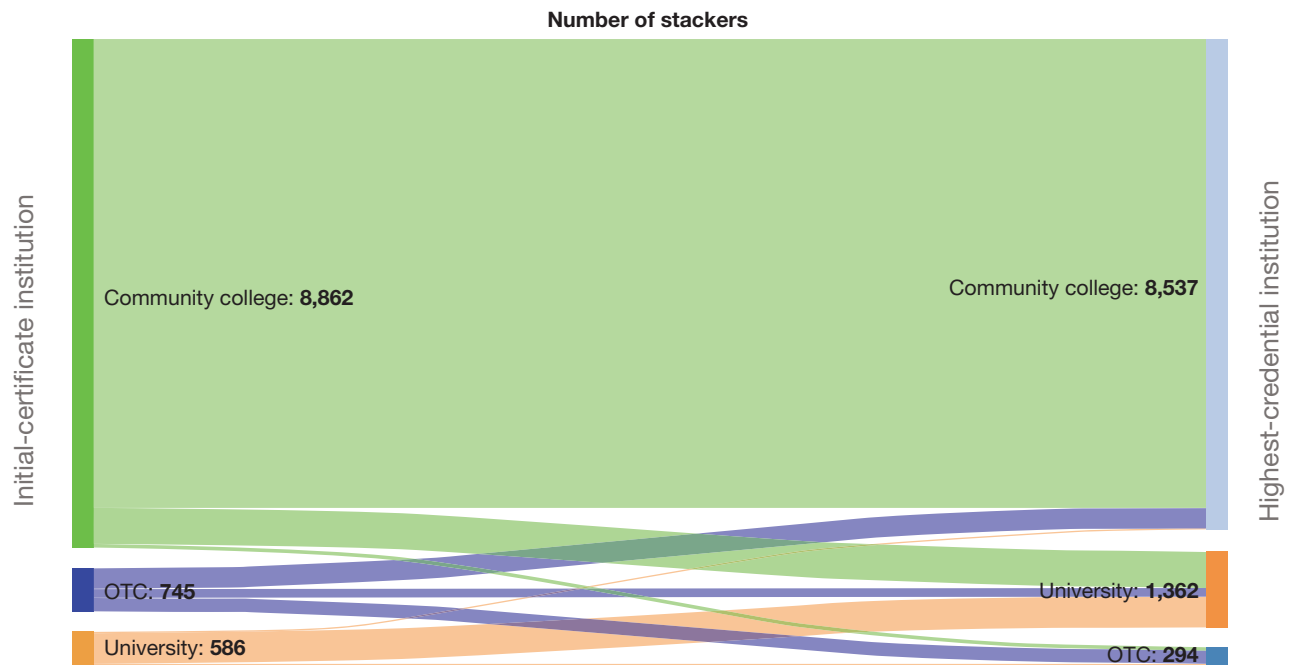


SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: This figure presents the percentage of individuals who earned credentials at multiple institutions, among individuals who earned an initial certificate in each of the three fields and overall (three fields combined) between 2005 and 2011 and then earned an additional credential at a different institution within four years. We display the results by the highest level of credential earned (another certificate, an associate's degree, or a bachelor's degree). Calculations are based on the following numbers of certificate-earners who went on to earn one or more additional credentials within four years, by field and highest credential earned: 1,366 (health care, certificate), 4,525 (health care, associate's degree), 521 (health care, bachelor's degree), 496 (MET, certificate), 1,752 (MET, associate's degree), 196 (MET, bachelor's degree), 126 (IT, certificate), 662 (IT, associate's degree), and 149 (IT, bachelor's degree).

FIGURE 12

Diagram of Stackers' Transition Between the Institution at Which the Initial Certificate Was Earned and the Institution Where the Highest Level of Credential Was Earned



SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: This figure presents the numbers of students who earned an initial certificate in one of the three fields between 2005 and 2011 and then earned one or more additional credentials within four years. The numbers on the left side represent the type of institution at which the initial certificate was earned, and the numbers on the right side represent the type of institution at which the highest level of credential was earned.

One of the aims of stackable credential programs is to align programs and ensure that coursework can be used to make progress toward more than one credential. In other words, for a student who completes a 30-credit-hour certificate program and later wants to earn a 60-credit-hour associate's degree in a related field, the student should be able to apply half or more of those credit hours from the initial certificate toward the associate's degree requirements. To examine how efficiently students who stack credentials are moving through their programs, we calculated credit accumulation and terms of enrollment, comparing two groups of students: those who earned a certificate and then an associate's degree and those who earned an associate's degree without having first earned a certificate (Table 2). We found that, overall, students who earned both a certificate and an associate's degree accumulated an average of 17 additional credit hours and were enrolled for approximately one and a half additional terms. The differences were

larger for students in the health care field than in the MET and IT fields.

When we examined these measures of efficient progress through stackable credentials for our key subgroups of interest, the results looked promising for the traditionally underserved populations. Non-white students who earned an associate's degree—whether through stacking or independently—did so with fewer credit hours relative to white students. Yet, when we compared students who stacked to the associate's level with those who earned an associate's degree only, the differences looked similar for white and non-white students (differences of 17.2 credit hours and 17.6 credit hours, respectively). The differences in terms of enrollment between stackers and associate's degree-only students also looked similar by race/ethnicity. When examining differences among age groups, we found that adult learners who earned associate's degrees also accumulated fewer credit hours overall

TABLE 2

Cumulative Number of Credit Hours Earned and Mean Number of Terms Enrolled for Associate's Degree–Earners, by Field, Race/Ethnicity, Age Group, and Whether the Degree Was Stacked with a Certificate

	Credit Hours Earned			Terms Enrolled		
	Certificate and Associate's Degree	Associate's Degree Only	Difference	Certificate and Associate's Degree	Associate's Degree Only	Difference
By field						
Overall	102.9	85.8	17.1	10.7	9.4	1.3
Health care	108.6	87.7	20.9	11.5	9.8	1.7
MET	93.5	81.4	12.1	9.3	8.3	1.0
IT	93.7	80.4	13.3	9.7	8.4	1.3
By race/ethnicity						
White	104.2	87.0	17.2	10.7	9.4	1.3
Non-white	98.2	80.6	17.6	10.8	9.4	1.4
By age group						
Adult learner	98.2	82.3	15.9	10.8	9.7	1.1
Younger learner	110.3	93.0	17.3	10.6	8.8	1.8

SOURCE: Author calculations based on HEI and OTC data in the Ohio Longitudinal Data Archive.

NOTE: The values in this table represent the average number of credit hours earned and the average number of terms of enrollment for (1) individuals who earned an initial certificate in one of the three fields between 2005 and 2011 and then earned an associate's degree within two years and (2) individuals who earned only an associate's degree in one of the three fields (i.e., did not stack on top of a certificate) in the same time frame. Calculations for individuals who earned a certificate and an associate's degree are based on the following numbers of students, by subgroup: 5,278 (health care), 2,318 (MET), 999 (IT), 6,792 (white), 1,454 (non-white), 5,228 (adult learner), and 3,367 (younger learner). Calculations for individuals who earned an associate's degree only are based on the following numbers of students, by subgroup: 62,958 (health care), 17,541 (MET), 8,062 (IT), 71,629 (white), 13,038 (non-white), 59,635 (adult learner), and 28,926 (younger learner).

relative to younger learners. And the differences between stackers and associate's degree–only students looked smaller for adult learners (an average difference of 15.9 credit hours) than for younger learners (an average difference of 17.3 credit hours). The patterns looked similar for terms of enrollment, with an average of one additional term of enrollment for adult learners who stacked credentials relative to those who did not stack, compared with nearly two additional terms of enrollment, on average, for younger learners.

When we examined stackers' outcomes based on whether they attended one institution or multiple institutions to earn their stacks, the patterns for credit accumulation and terms of enrollment looked less optimal (i.e., high numbers of credit hours accumulated and terms enrolled) for students who earned credentials across multiple institutions relative to students who stacked credentials within a single institution (see Table A.3 in the online appendix).

Discussion

This report provides a view into how students in Ohio have been stacking credentials after several policies and initiatives supporting stackable credentials were rolled out beginning in 2006. In this section, we discuss the findings for each of our three areas of inquiry and their implications for future policy, practice, and research.

Who Is Stacking Credentials?

Our findings suggest that there were large increases in the number of students earning certificates in health care and MET fields between the 2004–2005 and 2012–2013 academic years. This growth mirrored national trends in certificate growth found in California community college data (Bohn and McConville, 2018; Carnevale, Rose, and Hanson, 2012). We also found substantial increases in the

These findings provide some evidence suggesting that Ohio's efforts to scale stackable credential programs may have been successful but may not have affected all fields equally.

percentage of health care certificate-earners who went on to stack additional credentials within two years. Although the rates of stacking additional credentials were higher in IT and MET fields than in the health care field over the period examined, we did not see much movement in the rates of stacking over time. We also saw little change in the number of IT certificates earned. These findings provide some evidence suggesting that Ohio's efforts to scale stackable credential programs may have been successful but may not have affected all fields equally.

As a reminder, our analysis had a truncated period of observation (focused on the stacking of credentials through 2015), and some of Ohio's policies and programs supporting stackable credential development were established toward the end of or after that period. It could be that growth in stackable credential completion for MET and IT fields occurred after the period examined in this report. For example, Ohio was awarded substantial funding through TAACCCT grants in 2014 to build manufacturing certificate programs, but it may have taken time for these programs to be designed and to begin enrolling students, plus additional time for students to earn an initial certificate and then stack multiple credentials. It is also possible, however, that

institutions and students were responding to labor market needs, and the high rates of stacking already taking place among certificate-earners, the lower rates of growth in the labor market, or both meant that MET and IT programs were already addressing the needs of employers. In future reports related to this study, we will examine several additional years of data in order to better capture more-recent outcomes in these programs.

In examining whether stackable credential programs were serving specific populations of students who might have needed flexible degree pathways to address disparities in postsecondary achievement, we found that percentages of black students and adult learners were higher among students who earned certificates than among students who earned degrees only (without first earning certificates). However, among those who completed a certificate, black students and adult learners were *less likely* than white students and younger learners to then stack additional credentials. These findings are similar to what has been found in other research on certificates and stackable credentials (Bohn and McConville, 2018; Carnevale, Rose, and Hanson, 2012; Giani and Fox, 2017). There may be many explanations for these lower rates of stacking that cannot be addressed by the state or institutions, such as student preferences and constraints and the sorting of these students into fields that are less likely to require (or offer) multiple credentials. For example, a working adult may be able to rely on experience more than a younger student can and thus may not need the additional credentials to advance in a career, or the barriers to continuing with additional postsecondary credentials may be greater for older students. But, to the degree that disparities in rates of stacking were due to factors within the control of the state or institutions—such as regional differences in access to stackable programs, few night or weekend programs, or differences in advising for different subgroups—there may be things that institutions can do to address the disparities. We explored differences in the types of institutions where students initially earned a certificate as one possible contributor to disparities in rates of stacking, but it did not appear that black students and adult learners were overrepresented among students who earned an initial certificate at an OTC.

Additional research and exploration by institutions is needed to fully understand what is driving these disparities.

What Types of Credentials Are Being Stacked?

We found that most of the students in our data set were stacking credentials to the associate's or bachelor's degree levels, especially in MET and IT fields. This suggests that many of the stackable credential pathways offered by Ohio institutions had vertical components that provided students with the opportunity to earn degrees. In future stages of the study, we will more closely examine the program offerings to provide additional evidence on the design of these pathways. High rates of degree-earning among students who stack credentials may also say something about employer requirements or preferences for educational credentials. Future analyses examining returns in employment outcomes for different types of credentials will help shed light on whether these degrees are providing improved employment opportunities for students who earn them.

We also examined which subfields students were pursuing certificates and associate's degrees in. Across all three of our examined fields, there were one or two dominant subfields that accounted for a substantial portion of all credentials that were stacked. It is worth exploring further whether these distributions of stacking align with employment opportunities to ensure that there are not missed opportunities to build stackable programs in other high-need areas. Those overseeing programs in these dominant subfields may be able to offer insights to programs in other subfields that are newer to stackable credentials and looking to expand participation.

Results indicate that stacking was concentrated in a smaller number of IT subfields than was the case in health care and MET subfields: More than two-thirds of all students who stacked IT credentials concentrated in the top five certificate subfields (compared with fewer than half for health care and MET students). These patterns may also be due to a smaller number of program classifications and specializations offered in the IT field, as well as the

classification of some IT subfields within the industries in which the IT knowledge is being applied (e.g., health IT is classified as health care rather than IT). Stacking at the associate's degree level was found in broad general subfields across both health care and IT (e.g., computer and information sciences, general; liberal arts and sciences/liberal studies), which may be a signal that many of these students were planning to continue on to bachelor's degree programs.

In addition, we found that more than one in four certificate-earners went on to stack credentials outside of the field in which they earned their initial certificates, and rates of cross-field stacking were particularly high for IT certificate-earners. In some cases, postsecondary institutions created industry-specific IT programs (e.g., manufacturing IT), but other institutions may not have created these specialized IT programs and instead encouraged students to pair IT credentials with credentials in business, health care, manufacturing, and other fields. However, not all cross-field stacking took place in IT. For example, a substantial percentage of health care students earned associate's degrees in general liberal arts and sciences. One possible explanation is that these students were struggling to gain admission into competitive health care programs in certain subfields (e.g., nursing), and they either earned the general associate's degree while waiting to gain entry or switched fields entirely. Additional exploration into the reasons for cross-field stacking and the labor market implications of stacking across fields is necessary to fully understand whether these programs are benefiting students.

How Are Students Progressing Through Stackable Credential Programs?

Finally, we examined where and how students were moving through stackable credential programs. Ohio policy explicitly encouraged the development of stackable credential programs across all of its different types of institutions—OTCs, community colleges, and universities—and we found that all of these types of institutions played a role in providing stackable credentials. Community colleges and OTCs

were responsible for the vast majority of certificates earned, but universities played a greater role as students stacked to the degree level. Students who earned an initial certificate at a community college or university were more likely to earn additional credentials than were students who earned their first certificate at an OTC. There are a few possible explanations for why this was the case. It could be that students sorted into institutions according to their educational plans, so students who wanted to earn multiple credentials were more likely to attend community colleges and universities and students who wanted to earn just one credential were more likely to choose an OTC. Or perhaps students earning certificates at OTCs faced greater barriers to stacking, such as additional administrative requirements to convert clock-hour coursework into college credits or fewer advising efforts encouraging students to pursue additional credentials. State initiatives that allow students to more easily transfer coursework from OTCs to community colleges and universities may have helped students overcome some of these barriers but were largely rolled out after the period we examined in this report. We thus lack the data to determine which explanation is most relevant here, and further investigation is needed.

Most students stacked credentials at the same type of institution where they earned the initial certificate. This suggests that stacking across institutions may not have been needed, appealing, or easily achieved.

Our findings also indicate that most students stacked credentials at the same type of institution where they earned the initial certificate. This suggests that stacking across institutions may not have been needed, appealing, or easily achieved. Again, our period of examination may have been an issue because many of the articulation-focused initiatives in Ohio were rolled out more recently, and we may have observed higher rates of cross-institution stacking if we had been able to examine data for more-recent years. But, given that the state's initiatives supporting stackable credential programs have focused largely on articulation across institutions, it may be worth considering what else could be done to support strong stackable credential pathways within institutions.

And finally, we examined the total number of credit hours earned and terms of enrollment as indicators of how efficiently students were moving through several credential programs. The results suggest that students who stacked both a certificate and an associate's degree had accumulated an average of 17 additional credit hours and had enrolled for a little more than one additional term, on average, than students who earned an associate's degree only. There was a particularly large difference in number of credit hours earned and terms of enrollment among health care stackers relative to their peers who earned only an associate's degree. Health care programs can often be competitive and more difficult to gain entry into, which may result in students earning excess credit hours as they wait to gain admission. It may also be possible that fewer credit hours from health care certificate programs articulated into degree programs in these fields. Further exploration is needed to determine what was driving the higher numbers of credit hours among students who stacked credentials in health care relative to other fields.

We also identified several other interesting patterns in our analysis of credit hours and terms enrolled. We found that black and Hispanic students and adult learners who stacked credentials had smaller differences in credit accumulation and terms of enrollment than did their white and younger peers. This finding differs from prior literature showing that these underrepresented populations of learners are more likely to have excess credit accumulation in

universities (Bowen, Chingos, and McPherson, 2009). We also found that students who stacked credentials across multiple institutions accumulated many more credit hours (an average of 119 credit hours at the time of associate’s degree receipt) than did students who stacked within a single institution (102 credit hours). This suggests that, as we might suspect, there are more barriers to articulation of credit hours across institutions than there are across programs within an institution. However, it is possible that some of the articulation initiatives rolled out in more-recent years could have addressed some of the inefficiencies that are captured in these data from an earlier period.

Conclusion

Stackable credential programs have been a priority for Ohio as a means to better address the needs of employers and create new pathways through post-secondary education for students. In the past, there has been little evidence on the degree to which students are participating in and progressing through these stackable credential programs, and this report provides a view into whether and how students were stacking credentials across the state while several state policies and initiatives were being implemented. Findings suggest that the stacking of credentials has increased, and, in many ways, this stacking aligned

with expectations based on state policy and prior literature. However, these descriptive statistics were just a first step in understanding whether and how these stackable credential programs are benefiting students and employers in Ohio. A closer examination of the degree to which programs have been designed to be stackable and whether certain policies and programs have led to improved educational outcomes is an essential next step to understanding the benefits. Examining the employment and earnings outcomes associated with these programs is another essential element; if these programs do not provide value to individuals and employers, then the programs are not meeting their intended aims. In addition, although these findings point to some potential areas for improvement—such as implementing strategies to help raise the rates of stacking among black students, adult learners, and students who begin their pathways at OTCs—they do not provide a complete picture of why these patterns occurred or offer a solution for changing these patterns. More investigation is needed to determine why stacking is less often occurring among certain populations and in certain programs and institutions. Yet this initial look at stacking credentials in Ohio (1) provides some insights into where policymakers and institutional stakeholders might focus as they refine and scale stackable credential programs and (2) can point researchers to areas for deeper investigation.

Notes

- ¹ This is the first of several research products related to the study. Others will examine transitions into and out of the labor market, as well as education and labor market outcomes associated with enrollment in stackable credential programs.
- ² According to Community Research Partners (2008), the three key pieces of the Ohio Revised Code include Section 3333.34, which laid out goals for the stackable credential system; Section 3333.55, which created Accelerate Ohio, a program that offered low-cost non-credit and credit-bearing modules and courses in communications, mathematics, IT, and other fields for low-income working adults; and Section 3333.162, which called for efforts to facilitate the seamless transfer of career and technical credits. See Ohio Revised Code, undated.
- ³ Our discussion of MET focuses largely on the manufacturing aspect, but we decided to expand this category to include engineering technology fields because we found substantial overlap in educational program codes, and we could not identify an authoritative resource delineating which codes are considered manufacturing. The broader MET category therefore includes such job roles as civil engineering technician; automobile technician; and heating, ventilation, and air conditioning (HVAC) and refrigeration engineering technician that would not typically be considered manufacturing roles.
- ⁴ The figures and tables in this report use data from the Higher Education Information System (HEI) and OTC data files held by the Ohio Longitudinal Data Archive (see Ohio Longitudinal Data Archive, undated).
- ⁵ We discuss considerations of using a two-year window versus a four-year window in greater detail in the technical appendix to this report, available online. For our first key question (Who is stacking credentials?), we used the shorter window because it was important to capture more-recent cohorts. For our second key question (What types of credentials are being stacked?) and our third key question (How are students progressing through stackable credential programs?), we used the four-year window because we wanted to capture higher levels of credentials that might take more than two years and to examine varying trajectories through these higher-level credentials.
- ⁶ As noted earlier, examining students' outcomes over longer periods allows for more students to stack and for students to stack to higher levels of credentials. To allow us to capture more of the students stacking to the degree level, our analyses in future reports will focus on stacking within four years of initial certificate completion.

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About This Report

Creating programs that facilitate students' ability to earn multiple post-secondary certificates or degrees (*stackable credentials*) has been a priority for Ohio, which has a long history of legislation, state and regional initiatives, and institution-led efforts to build more-effective pathways to address the needs of employers and students. To assess progress and inform ongoing efforts to scale stackable credentials, the Ohio Department of Higher Education and the RAND Corporation established a research partnership. The Ohio Stackable Credentials Project will include several reports, a toolkit, and presentations to key stakeholders and national audiences. This is the project's first report, which documents the participation and progress of students who earned a certificate in health care, manufacturing and engineering technology, or information technology at an Ohio institution and went on to earn (or stack) additional credentials.

The study was undertaken by RAND Education and Labor, a division of the RAND Corporation that conducts research on early childhood through post-secondary education programs, workforce development, and programs and policies affecting workers, entrepreneurship, and financial literacy and decision-making. This study was sponsored primarily by the ECMC Foundation but was also supported by funding from the U.S. Department of Education's Institute of Education Sciences (grant number R305H190033). The opinions expressed in this report are the authors' alone and do not represent the views of the ECMC Foundation or the Institute of Education Sciences.

More information about RAND can be found at www.rand.org. Questions about this report should be directed to Lindsay Daugherty at ldaugh@rand.org, and questions about RAND Education and Labor should be directed to educationandlabor@rand.org.

Acknowledgments

This study would not have been possible without close collaboration from partners at the Ohio Department of Higher Education, including Stephanie Davidson, Cheryl Rice, Anthony Landis, and Brett Visger. We are thankful for the valuable feedback we received on the report from Shannon McConville, Charles Goldman, Tom Prendergast, Jarrod Tudor, Tony Human, Cindy McQuaid, and Stephanie Davidson. This research also benefited from the input of the project advisory group's members: Devin Babcock, Mark Bell, Bill Bussey, Paula Compton, Jill Dannemiller, Michael Evans, Emily Fabiano, Tony Human, Lauren Massie, Cindy McQuade, Tom Prendergast, Wayne Schneider, Sara Tracey, Jarrod Tudor, and Qiana Williams.

The data used in this report were obtained through the Ohio Longitudinal Data Archive, which is a project of the Ohio Education Research Center (oerc.osu.edu) and provides researchers with centralized access to administrative data. The archive is managed by Ohio State University's Center for Human Resource Research (chrr.osu.edu) in collaboration with Ohio's state workforce and education agencies (ohioanalytics.gov), which provide oversight and funding. For information on sponsors of the Ohio Longitudinal Data Archive, see chrr.osu.edu/projects/ohio-longitudinal-data-archive. We are grateful to Lisa Neilson for her critical assistance with the data.

Finally, we are grateful to our funders for their support of this research and partnership engagement.



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