Understanding Short-term Credentials

Katrina Borowiec, PhD Candidate

Boston College

October 9, 2021

This work was made possible due to generous funding from the Ascendium Education Group, with additional support from SREE, Dr. Di Xu, and Dr. Angela Boatman.

TABLE OF CONTENTS

SECTION **PAGE**

EXECUTIVE SUMMARY

Rapid advances in technology have changed workforce needs. Indeed, to remain competitive in the labor market, U.S. workers are expected to regularly improve their professional skills and competencies. While obtaining a bachelor's degree remains the most secure option for stable employment and a middle-class income, there is growing attention on alternative, short-term educational pathways including credit-bearing certificates, work-based training, bootcamps, massive open online courses (MOOCs), and competency-based education programs (Brown & Kurzweil, 2017; Carnevale et al., 2020; NCRN, 2019). Some states, such as Ohio and Virginia, have engaged in widescale efforts toward increasing credential attainment (Daughtery et al., 2020; Kazis et al., 2021).

The current study focused on enrollment and outcomes for students in *short-term credit-bearing certificate* programs, defined for this study as academic programs lasting less than one year of full-time academic study and requiring fewer than 30 credits. The number of students awarded short-term certificates increased 50% from 342,589 in 2002-03 to 512,799 in 2019-20 (U.S. Department of Education, IPEDS 2002-03 to 2019-20). Compared to students in bachelor's degree programs, students enrolled in credit-bearing certificates are more likely to be the first in their families to attend college, to have lower incomes, and to be students of color (Carnevale et al., 2012; Carnevale et al., 2020).

The evidence concerning the labor market value of short-term certificates is mixed, but there is clear evidence that short-term credentials hold less labor market value than associate degrees (Bahr, 2016; Bohn et al., 2019; Dadgar & Trimble, 2015; Grubb, 1997; Ositelu, 2021; Xu

& Trimble, 2016). The labor market benefit of short-term certificates depends on many factors, including gender, race/ethnicity, field of study, and the occupation where the student secures employment upon earning their credential (e.g., Bahr et al., 2015; Bohn et al., 2019; Ositelu, 2021). Importantly, women and racial/ethnic minorities disproportionately complete certificates in fields with lower economic gains in the labor market (Carnevale et al., 2012; Ositelu, 2021). Accordingly, researchers have cautioned policymakers from viewing short-term credentials as a "magic bullet" for addressing longstanding inequities in educational attainment and subsequent labor market outcomes in the United States (Belfield & Bailey, 2017a; Carnevale et al., 2012; Dadgar & Trimble, 2015).

Despite these cautions, short-term credentials have pushed higher education leaders and policymakers to think innovatively and expand their vision concerning what "counts" as a quality education. More research is needed to understand how short-term certificates and other credentials might serve as an onramp toward a higher credential.

INTRODUCTION

The skills needed for success in today's workforce are rapidly changing in response to swift advances in technology. Although adults are increasingly enrolling in postsecondary education, the rate at which they earn credentials pales in comparison (Kurzweil, 2018). This low completion rate leaves a gap in employees with the in-demand skillsets needed relative to the market demands for skilled workers in the United States. Indeed, employers have lamented the shortage of potential employees with the skills needed to match their job openings (Association for Career and Technical Education [ACTE], 2011). Whereas in past decades, employers provided ongoing professional development and training to their employees, this responsibility now primarily falls under the purview of postsecondary education.

The past decade has been characterized by an intense push for all adults in the United States to earn a postsecondary credential. This effort can be traced back to then-President Obama who challenged all adults to complete one or more years of postsecondary education when he took office (Bosworth, 2010). President Biden's Build Back Better agenda includes funding for states to improve their residents' job opportunities by creating accelerated pathways to earn postsecondary credentials (White House, 2021). The combined efforts over the past decade have increased policymakers' focus on workforce development.

Short-term or alternative credentials provide opportunities for workers to increase their job prospects in a shorter period of time and for a lower cost than a degree program and are more responsive to industry needs and rapidly changing in-demand skills (ACTE, 2011; Collins & Hoffman, 2021). Short-term or alternative credentials, such as certificates, licenses, badges,

MOOCs, and nanodegrees, are considered "alternative," as they represent educational options other than an associate or bachelor's degree, the latter of which still remains the gold standard in postsecondary education (Brown & Kurzweil, 2017). These alternative credentials are especially appealing to older students, students with children, and others who need to advance in their careers but do not have time to complete a degree (Kurzweil, 2018). Online access to these programs can be very appealing for adult learners who often work while studying. The traditional postsecondary educational system makes it difficult for students to earn credit for prior on-the-job learning and to return to their academic studies after "stopping out" for an extended period (Ganzglass, 2014).

While short-term credentials offer considerable promise in terms of their flexibility and responsiveness to workforce needs, much remains unknown about these programs. Thus, the current study aims to understand short-term credentials by answering five research questions:

1. What types of short-term credentials are available (e.g., certificates, diplomas, micro-credential) and how are they defined?
2. What is the demographic profile of students who pursue short-term credentials (specifically, learners who do not already have a postsecondary degree)?
3. What does existing research say about the outcomes (credential completion, employment, earnings, continued education, upward mobility) for students who pursue these credentials?
4. What factors may affect these outcomes (including state and institutional policy, programmatic factors)? This includes factors that still need to be analyzed or

understood (e.g., system-based approaches, programmatic, faculty/staff, financial aid, delivery, format).

5. What system-wide changes or state-level policies might influence short-term credential offerings and attainment?

METHODOLOGY

The current study combines information gleaned from a literature review and supplemental analyses of publicly available secondary data to answer the five research questions. Each component of the methodology is described below.

Literature Review

The primary data source for this study was the review of the available research literature on short-term credentials. The literature search included peer-reviewed journal articles, book chapters, policy reports, state websites, news releases, and other sources. The literature search began with the Education Resources Information Center (ERIC) - ProQuest database using the following search terms: short term credentials, short term educational credentials, micro-credentials, stackable credentials, digital badges, sub-baccalaureate credentials, and alternative credentials. Of the 506 items resulting from the initial search, 183 items were deemed “in scope” for the project. Additional resources were identified from a Google internet search (including Google Scholar), materials provided by Ascendium Education Group, and reference lists. Only the most relevant materials are presented below.

Supplemental Analyses

While this review primarily relies on the literature review to answer the five research questions, I supplemented the literature review with additional descriptive analyses. First, I queried the National Center for Education Statistics (NCES) Trend Generator tool to pull descriptive information about the number of certificates earned between 2002-03 and 2019-20 using data from the Integrated Postsecondary Education Data System (IPEDS). Second, I utilized the NCES PowerStats tool to examine students' enrollment and persistence in sub-baccalaureate certificate programs using data from the Beginning Postsecondary Students Study (BPS) 2012-17. These analyses provided additional information that was not available in the literature.

SHORT-TERM CREDENTIALS

The current study focuses on nondegree short-term credentials, which have also been referred to as "alternative credentials." They are viewed as alternative pathways to employment opportunities and economic security compared to the traditional college degree (Brown & Kurzweil, 2017). The short-term credential landscape is vast and complex in terms of types of programs and educational providers (e.g., community colleges, for-profit providers) (Credential Engine, 2021).

Brown and Kurzweil (2017) organize alternative credentials into five categories: certificate programs; work-based training; skills-based short courses; massive open online courses (MOOCs) and online micro-credentials; and competency-based education programs. In

comparison, the Nondegree Credentials Research Network (NCRN, 2019) classifies nondegree credentials into these five categories: certificates, certifications, licenses, apprenticeships, and bootcamps. Both classification schemes overlap (see Table 1). The only major difference is that NCRN does not specifically mention MOOCs in their categories.

Importantly, these classification schemes should be viewed as working typologies. The categories *within each classification scheme* have potential overlap. For example, a certificate could fall under both Brown and Kurzweil's (2017) certificate program category and their competency-based program category, if the certificate program took a competency-based approach to awarding academic credit. Hence, at this point, these categories should not be viewed as mutually exclusive. With this caveat in mind, each type of credential will be briefly discussed below.

Table 1. ***Classifying Short-Term Credentials***

<table>
<tr><th colspan="2">Brown and Kurzweil (2017)</th><th>NCRN (2019)</th></tr>
<tr><td rowspan="3">Labor market training and credentialing</td><td>Certificate programs</td><td>Certificate</td></tr>
<tr><td>Work-based training</td><td>Apprenticeship</td></tr>
<tr><td>Skills-based short courses</td><td>Bootcamp</td></tr>
<tr><td></td><td>MOOCs</td><td></td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Competency-based programs</td><td>Certification</td></tr>
<tr><td>License</td></tr>
</table>

Certificates

NCRN (2019) defines a certificate as a "credential issued in recognition of a postsecondary course of study, which can be either for-credit or noncredit" (p. 2). Carnevale et al. (2012) provide a somewhat different but complementary definition: "Certificates are recognition of completion of a course of study based on a specific field, usually associated with a limited set of occupations" (p. 3). Certificate programs are defined by the strong ties between their curriculum and occupational skills and employment options (Carnevale et al., 2012, 2020). Indeed, more than nine out of ten certificates (94%) are awarded in career-oriented fields (Carnevale et al., 2020).

Importantly, *certificates* differ from *certifications* which require examinations to prove one's competency in a specific industry (Brown & Kurzweil, 2017). However, students can use a certificate program as the foundation to apply for a certification.

There is also a considerable diversity of offerings that can be classified as undergraduate level "certificate" programs. First, certificate programs can be classified in terms of whether they are based on credit or noncredit coursework (Kazis & Leasor, 2021). Second, certificate programs can be classified by length, as displayed in Table 2 (Bahr et al., 2015; Bahr, 2016; Bohn et al., 2019a, 2019b; Carnevale et al., 2012; Carruth & Palica, 2018, 2020; Xu & Trimble, 2016). Using Carnevale et al.'s (2012) categories, short-term (54% of certificates), medium-term (41%), and long-term (5%) certificates, respectively, take less than one year, one to two years; and two to four years to finish.

Table 2. ***Certificate Types***

Bahr et al. (2015)	Bahr (2016)	Bohn et al. (2019a, 2019b)	Carnevale et al. (2012)	Carruth & Palica (2018, 2020)	Xu & Trimble (2016)
Short-term certificate (<15 credits)	Low credit award (<6 credits)	Short-term certificates (6-29 credits)	Short-term certificate (<1 year)	Certificate of proficiency (<1 year)	Short-term certificate (<1 year of full-time study)
Long-term certificate	Short-term certificate (6 to 29 credits)	Long-term certificates (30-59 credits)	Medium-term certificate (1 to 2 years)	Certificate of completion (1 year)	Long-term certificate or diploma (1 year or more of full-time study)
	Long-term certificate (30 to 59 credits)		Long-term certificate (2 to 4 years)		

Work-Based Training Programs

The second broad category of short-term credentials is work-based training programs, such as apprenticeships (Brown & Kurzweil, 2017). NCRN (2019) defines apprenticeships as "formal programs of study that blend work experience with a structured program of coursework" (p. 2). Learners gain access to work-based training programs through their employers or other local workforce training programs (Brown & Kurzweil, 2017).

Skills-Based Short Courses

The third category of short-term credentials is skills-based short courses (Brown & Kurzweil, 2017). These courses are designed to provide intensive, quick training in an in-

demand field. Coding bootcamps, which came into the marketplace around 2012, are one type of program falling under this category (Kurzweil, 2018). NCRN (2019) defines bootcamps as “a variant of certificate programs that are particularly popular in technology related fields, offering immersive instruction and project-based learning over a period of up to a few months" (p. 2). These *intensive* programs are typically *noncredit* and focus on *technical skills* like coding, software development, and data science (Kurzweil, 2018; NCRN, 2019).

Bootcamps have been growing in popularity. According to data from Course Report (2020), the number of graduates of coding bootcamps increased from 2,178 in 2013 to 23,043 in 2019. Nearly 3 out of 4 (74%) bootcamp graduates had previously earned a bachelor’s and/or graduate-level degree (Course Report, 2020). Thus, bootcamps are not seemingly opening opportunities to those without formal postsecondary education, but rather increasing the skills of the highly educated.

Massive Open Online Courses (MOOCs) and Online Micro-Credentials

The fourth category is massive open online courses (MOOCs) and online micro-credentials (Brown & Kurzweil, 2017). Since they have no admission requirements or enrollment limits, students of all academic backgrounds and qualifications can sign up for a MOOC for a minimal or no cost (Council for Higher Education Accreditations [CHEA], 2019). While offered as early as 2008, MOOCs skyrocketed in popularity around 2012 when Coursera and edX entered the marketspace (Brown & Kurzweil, 2017; Kurzweil, 2018). While many forms of alternative credentialing have been marginalized within the postsecondary landscape (Kazis & Leasor, 2021), Coursera and edX collaborated with the most prestigious universities in the

United States and around the world. Some traditional colleges, like the University of Illinois, have partnered with Coursera or edX to offer micro-credentials that can be stacked to a degree.

Competency-Based Programs

The final category of short-term nondegree programs is competency-based education programs, which are geared toward older adults seeking flexible pathways to a credential (Brown & Kurzweil, 2017). Since the emphasis is on demonstrated competencies, these programs often recognize prior learning experiences that take place outside the traditional classroom environment (Brown & Kurzweil, 2017). The NCRN (2019) classifies certification programs and licenses as competency-based programs. Both certifications and licenses are awarded when a student demonstrates a specific set of competencies, but licenses are required by the state to practice and must be renewed periodically (NCRN, 2019).

Working Definition for Short-term Certificate

Short-term or alternative credentials represent a range of credit and noncredit academic offerings by traditional postsecondary institutions and alternative providers (Brown & Kurzweil, 2017). The current literature review focuses on credit-bearing short-term credentials awarded by community colleges (i.e., sub-baccalaureate certificates) in the United States to students without a college-level degree. Usually, these programs are referred to as "certificates."

However, "short-term certificates" are defined differently across studies. For instance, in one study, a short-term certificate was defined as a program of less than 15 credits (Bahr et al., 2015), whereas in another study, a short-term certificate was defined as 6 to 29 credits

(Bahr, 2016). These differing definitions can likely be attributed to differences in how states categorize their sub-baccalaureate certificate offerings and other workforce credentials. The imperfect overlap in definitions presents methodological complications with respect to ensuring that comparable programs are being discussed.

Synthesizing information across studies, my definition of a short-term certificate is *an academic program lasting less than one year of full-time academic study and requiring fewer than 30 credits*. However, in my literature review, I have defaulted to the definition of short-term credentials used by the author of each article or report, which might differ slightly from my definition. In addition, information about long-term certificate programs is presented where appropriate. Some studies did not disaggregate findings by length of the certificate program.

STACKABLE CREDENTIALS

Certificate programs are typically discussed in terms of their eventual "stackability" to higher-level qualifications, such as an associate or bachelor's degree. The U.S. Department of Labor (2010) provides the following definition of stackable credentials: "a sequence of credentials that can be accumulated over time to build up an individual's qualifications and help them to move along a career pathway or up a career ladder to different and potentially higher-paying jobs" (p. 6). All stackable credentials should be short in duration and increase students' earnings (Bailey & Belfield, 2017a). In theory, stackable credentials offer students flexibility, in that they could potentially complete one credential in the stack, step back into the workforce, and then return to complete the next credential (Kazis & Leasor, 2021). When a short-term

credential is offered as part of a stack of progressively more advanced credentials, the short-term credential can provide an on-ramp to an associate or bachelor's degree (Brock, 2021).

The rhetoric around stackable credentials sometimes presumes that they are all the same, when in fact, there are multiple types (Bailey & Belfield, 2017a; Kazis & Leasor, 2021). Kazis and Leasor (2021) classify stacking as either *vertical*, meaning that each program leads to a higher-level credential, or *horizontal* which provides learners with expanded areas of expertise, but not higher credentials. Bailey and Belfield (2017a) identify three types of stackable credentials: progression, supplemental, and independent. Progression stacks often begin with a short-term nondegree credential, such as a certificate, and culminate in a higher credential such as a long-term certificate, associate degree, or bachelor's degree. Progression stacks should also present a clear path from initial enrollment in the first credential to completion of the most advanced credential in the stack. This is the type of stackable credential that policymakers and college leaders typically discuss. Whereas the typical progression stack student does not have a postsecondary degree, a degree holder might complete a supplemental credential, such as a short-term certificate, to retrain for a new job or advance in their current field. The choice to stack independent certificates is typically driven by students' interests to acquire a range of complementary skills and is not formally coordinated by the institution.

Ganzglass (2014) identified innovative examples of how institutions in Oregon, Wisconsin, and Kentucky are incorporating stackable credentials into their postsecondary system. For instance, Oregon's community colleges and Wisconsin's technical colleges are embedding short-term, credit-bearing credentials into long-term, financial aid eligible

programs. This combination allows students to earn qualifications that can increase their employability for an entry-level job, while setting them on a path to earn a higher credential. Rogue Community College in Oregon has a Basic Health Care foundations certificate program that covers basic entry-level health care skills and provides multiple pathways for students to obtain additional credentials in multiple, related fields. Kentucky modularized its online and in-person occupational programs, so that each module represents discrete competencies, and students can complete a pre- and post-test to demonstrate their competencies.

PROGRAM SPOTLIGHT

Kingsborough Community College (New York)

Culinary Arts Program (Audant, 2016)

Kingsborough Community College in New York has three culinary arts programs: 7-credit culinary arts workforce training program; 27-credit certificate in culinary arts and food management; and 60-credit associates degree in tourism and hospitality/culinary arts (Audant, 2016). The workforce training and certificate program is geared toward students who might need additional reading, writing, and math academic support. Workforce training students have access to comprehensive support services that include academic advising, academic skills development, and career development. The 9-month retention rate for the workforce training program is approximately 85% and the job placement rate is 67%. However, few students matriculate into the degree program after completing the workforce training program. The workforce training program offers an onramp to the culinary industry, but without the associate degree, there is little room for career advancement.

Currently, there are methodological challenges to studying stackable credentials. Available administrative datasets make it difficult to identify students' pathways toward achieving multiple credentials (Bailey & Belfield, 2017a). More detailed datasets that map students' pathways through multiple credentials and their credit accumulation along the way

will allow researchers to better understand whether progression stackable credentials are functioning as intended (Bailey & Belfield, 2017a). For example, Bailey and Belfield (2017a) would like to examine more closely whether students move from one credential to the next highest without losing credit.

Short-term Credential Providers

While many short-term credentials can be obtained from degree-granting postsecondary institutions, students can also earn these credentials from alternative educational providers such as bootcamps, MOOCs, and trade schools. Almost twenty years ago, Flynn (2002) noted the rise in alternative credential providers that were increasingly providing the types of education and training opportunities that were traditionally offered by community colleges. Flynn suggested that community colleges were seemingly unable to quickly adjust their delivery model due to state and federal regulations. In comparison, corporate culture is innovative, quick moving, and less cautious than higher education which enables for-profit providers to rapidly step into the credentialing space that has traditionally been reserved for nonprofit postsecondary institutions. Moreover, when an IT company, for example, offers an IT credential, there is a certain level of assurance that the credential will meet industry standards (Flynn, 2002).

One key characteristic that distinguishes these alternative providers from traditional postsecondary institutions is that they operate on a business model without public funding and without requiring accreditation (CHEA, 2019). Since they operate outside the constraints that

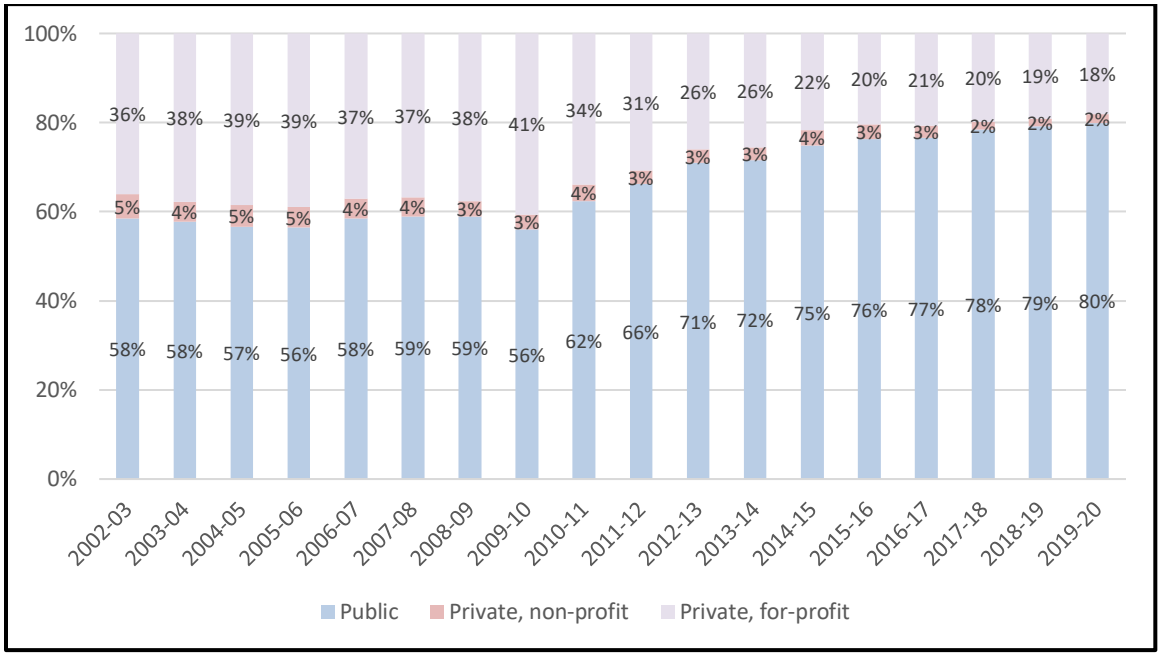
may limit traditional institutions, they have more flexibility to adjust their curriculum and program offerings in response to changing labor market demands (CHEA, 2019). Some providers have been very creative in the names they have developed to describe their particular branding for micro-credentials—for example, Udacity's nanodegrees. Some traditional institutions have started to offer similar alternative credentials (CHEA, 2019).

Some have expressed concerns that for-profit institutions will take advantage of students by charging a high price for their product and overpromising on what outcomes they can deliver (Kurzweil, 2018). In their fieldwork with 150 Black inner-city youth, Holland and DeLuca (2016) found that some for-profit institutions actively engage in exploitive practices that prey on vulnerable inner-city Black students. In some cases, these institutions hide important pieces of information in the fine print, and students do not realize until it is too late.

Many of these for-profit providers operate outside traditional systems of federal oversight because they do not receive any federal funding (Kurzweil, 2018). Interestingly, CHEA (2019) reported that accreditors have expressed minimal interest in expanding their oversight to alternative providers. Rather, any oversight that they engage in relates to partnerships between alternative providers and traditional postsecondary institutions.

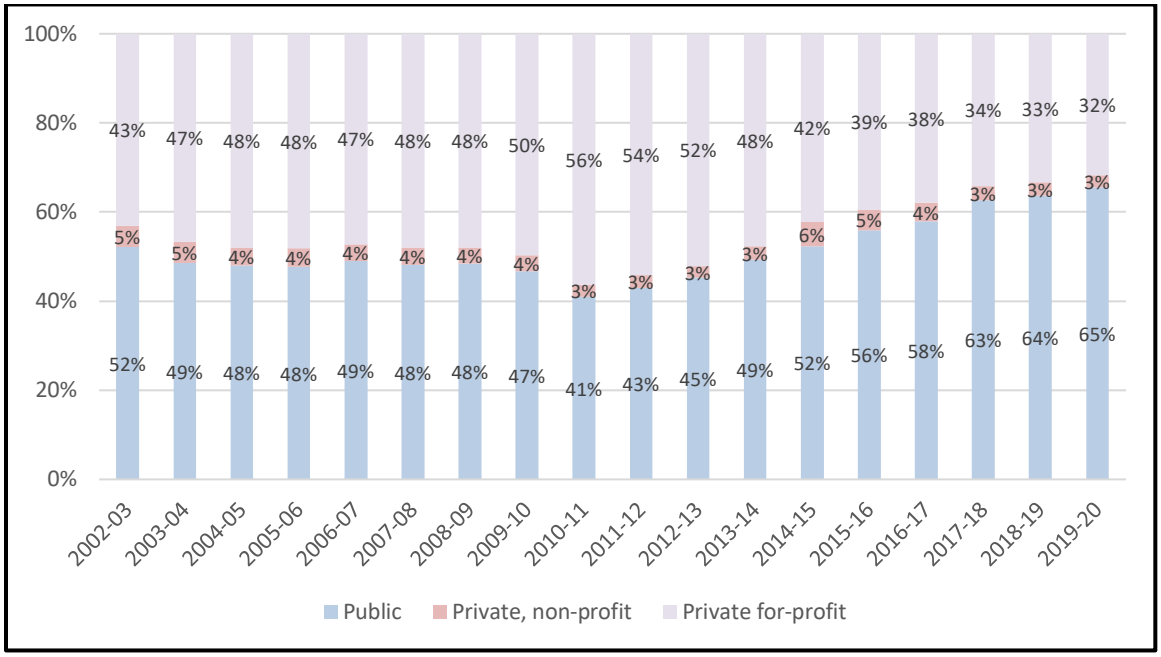
Given these concerns about for-profit providers, it is notable that the share of short-term (36% vs. 18%) and long-term (43% vs. 32%) certificates awarded by for-profit providers has decreased between 2002-03 and 2019-03 (see Figures 1 and 2). For-profit providers awarded a higher share of long-term certificates relative to short-term certificates.

Figure 1. ***Market Share of Short-term Certificates by Sector***



Note. Short-term certificates are sub-baccalaureate credentials lasting less than one year. These data are from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Figure 2. ***Market Share of Long-term Certificates by Sector***



Note. Long-term certificates are sub-baccalaureate credentials lasting more than one year but less than two years. These data are from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

At the same time, the data presented in Figures 1 and 2 are from IPEDS. Institutions that do not receive federal funding are not required to report data to IPEDS. Thus, IPEDS might underestimate the proportion of short-term certificates awarded by for-profit providers.

Credential Engine (2021) identified 967,734 total credentials being offered to students in the United States, including degrees, certificates, and other non-degree credentials. Traditional postsecondary educational institutions offered 359,713 unique certificates and degrees. Non-academic organizations offered the largest share of all credentials (549,712). These 549,712 credentials include digital badges, online course completion certificates, registered apprenticeships, and occupational licenses. Additionally, 9,390 credentials were offered by MOOC providers.

Short-term Credential Policies and Programs

Higher education policymakers and administrators have responded to calls for a more educated workforce with initiatives around workforce development, alternative short-term educational credentialing, and stackable credentials. These diverse initiatives are organized into seven categories across 14 states: state short-term credential and stackable credential legislation (Table 3); micro-credential task force initiatives (Table 4); campus-level short-term and stackable credential initiatives (Table 5); scholarship funding for workforce development (Table 6); state strategic goals concerning short-term credentials (Table 7); exploratory research studies on stackable credentials (Table 8); and miscellaneous workforce development policy initiatives (Table 9).

Table 3. ***State Short-term Credential and Stackable Credential Legislation***

State	Description
New Jersey	In 2020, New Jersey passed the Work and Learn Consortium Bill (N.J. Stat. § 18A:54-43 Section 18A:54-43), which is designed to create partnerships between educational institutions, the NJ Department of Labor and Workforce Development, and workforce investment boards. The bill includes language around creating opportunities for students to earn stackable credentials. Specifically, the goal of the law is to "provide students with an opportunity to earn *stackable credentials* that will increase the likelihood of employment in industries of high demand and future growth in the State; develop a *guided pathway* for students to earn those credentials; and allow enrolled students to choose among multiple program stop-out points" (para. 2; emphasis added).
Ohio	Ohio has been a leader in workforce development. In 2008, the Ohio General Assembly passed legislation to diminish the gap between employers' demands and adults' postsecondary training and expertise (Community Research Partners, 2008). The legislation (HB 699) called for the Ohio Department of Education and the Board of Regents to create a statewide stackable credentials system. The legislation referred to the credentials as "pre-college stackable certificates" and "college-level certificates." These pre-college stackable certificate programs were developed for adults with an academic skill level between sixth grade and high school, who might otherwise be unable to access higher education. The framework included a progressive set of stackable certificates at the entry-level, intermediate, and advanced levels (Community Research Partners, 2008). Since then, the Ohio General Assembly, Ohio Department of Higher Education, and public higher education and career-technical training schools have collaborated to create multiple pathways for students to earn their preferred educational credentials, through clear credit articulation and transfer policies and by awarding credit for prior learning (Ohio Department of Higher Education, 2021). Daughtery and colleagues (2020) examined workforce development trends in Ohio. Following the 2008 legislation, the number of students earning certificates and stacking credentials increased between 2005 and 2013. Among credential stacking students, 71% ultimately completed an associate degree and 9% completed a bachelor's degree within four years of completing the initial certificate. However, white students were more likely than Black students to stack credentials, as were students aged 24 or younger compared to adults aged 25 or older.
Virginia	In 2015, the Virginia Community College System was directed by the general assembly to create a plan for increasing the numbers of middle

	skill workers, in response to employer demands (Kazis & Leasor, 2021). Additionally, in 2016, the Virginia legislature increased the state investment in noncredit workforce training. All 23 of the community colleges in Virginia participate in the FastForward training programs which grew from these policy developments (Kazis & Leasor, 2021; Virginia's Community Colleges, 2021). Each training program lasts six to twelve weeks. FastForward has demonstrated success in terms of student completions (Kazis & Leasor, 2021). Over nine out of ten (93%) students (a total of over 24,500 people) who enrolled in the FastForward initiative have earned a credential, most of whom have since gone on to experience wage gains of 25% to 50%. One success of FastForward is that it is reaching populations of potential learners that the Virginia Community College System has historically found challenging to enroll (Kazis & Leasor, 2021). For example, two out of three enrollees were entering postsecondary education for the first time. Approximately 40% of enrollees are students of color and on average students are 36 years old. Compared to the degree-seeking population at community colleges in Virginia, FastForward students are more likely to be receiving Temporary Assistance for Needy Families (TANF) or Supplemental Nutrition Assistance Program (SNAP) financial benefits. Importantly, to recruit this diverse population, Virginia community colleges have recruited with community and faith-based organizations. To support students, Virginia community colleges hired career coaches who serve as academic advisors, while also providing assistance completing financial aid forms and applying for jobs (Kazis & Leasor, 2021). FastForward has a pay-for-performance model. Each student enrolled through the FastForward initiative is responsible for paying one third of the cost (approximately $1,100 on average) (Kazis & Leasor, 2021). However, the state's Financial Aid for Noncredit Training Leading to Industry Credentials (FANTIC) program will pay for as much as 90% of the student's contribution if the student's income is below 200% of the federal poverty line. The state pays one-third of the tuition when the student completes the training program, but the student must pay this one-third if the program is not completed (National Conference of State Legislature [NCSL], 2018). The state pays the institution an additional one-third of the cost if the student earns a workforce credential after the training (NCSL, 2018). The costs are therefore shared by the student, the state, and the institution. The student and institution benefit directly when the student succeeds. The FastForward initiative aligns with Virginia Governor Northam's Get Skilled, Get a Job, Give Back (G2) workforce initiative, which focused on high demand occupational fields such as early childhood education, health

	care, IT, public safety, and skilled trades (Kazis & Leasor, 2021). Governor Northam also used his discretionary funds to flip the program sequence for these programs such that technical courses precede general educational requirements. This switch is a key part of why FastForward certificates can ultimately be used as the first third of coursework necessary for an associate degree. Despite some of the successes experienced from the FastForward initiative, there is limited evidence that students are continuing their education after completing the initial workforce training program (Kazis & Leasor, 2021).

Table 4. ***Micro-Credential Task Force Initiatives***

State	Description
Maine	In June 2018, the University of Maine System (UMS) issued a report on adult degree completion, which called for stackable credentials that would provide affordable, flexible, accelerated opportunities for adults to successively attain multiple credentials and to meet workforce needs (UMS Micro-Credential Steering Committee, 2019). Based on this recommendation, the UMS Micro-Credentialing Steering Committee (2019) was established in January 2019. The initial work of the committee has centered on formulating a framework for stackable micro-credentials. Micro-credentials include external credentials, industry credentials, and badges awarded internally by UMS, and they incorporate credit and noncredit courses. Credentials will include built-in assessment of competencies that are directly tied to real-world demands.
New York	The SUNY system's Micro-Credentialing Task Force (2018) defined micro-credentials as "credentials that verify, validate and attest that specific skills and/or competencies have been achieved and are endorsed by the issuing institution, having been developed through established faculty governance processes and designed to be meaningful and high quality" (p. 3). The Task Force included senior administrators, faculty, and students throughout the SUNY system. The Task Force issued a set of recommendations for quality standards and implementation policies throughout its 64-campus system. SUNY Dutchess Community College (2021), for example, has created various stackable credential programs – i.e., a 5-credit basic bookkeeping micro-credential that can be stacked to an associate degree in business administration. Quality standards for new micro-credentials are maintained through the faculty governance process.

Table 5. ***Campus-Level Short-term Certificate and Stackable Credential Initiatives***

State	Description
Colorado	Mi Casa Resource Center, the Community College of Aurora, and Metropolitan State University of Denver partnered with the financial industry to create a stackable pathway from certificates to bachelor's degrees and to jobs (Hasan & Collins, 2020). The goal of this initiative was to ensure that there would be enough skilled workers to fill job openings in the financial industry.
Oregon	Rogue Community College in Oregon also has a Basic Health Care certificate program. The program serves as a foundational certificate that provides students entry-level competencies and as a launching pad for multiple pathways in related fields (Ganzglass, 2014).
Tennessee	Tennessee's Technology Centers (TTC), a group of 27 institutions, is an exemplar with respect to its occupational certificates (Carnevale et al., 2012). TTC offers 50 certificate programs that can be completed in two years for $2,400 per year. Over 70% of students come from households earning an annual income less than $24,000, and hence, most students' tuition is covered by Pell grants and additional scholarships. Moreover, over 70% of students finish their occupational program, which is much higher than the 13% of students who complete their community college credential in Tennessee. Furthermore, 83% of graduates are successfully placed in their occupational field of study and 95% pass relevant certification tests upon their first try. TTC has a unique, highly structured delivery model, in that students complete all their courses with one or two teachers and attend class for about six hours per day. The emphasis is on skill acquisition. Faculty, staff, and the administration are all central to providing support services to students. There is no remedial coursework; instead, students complete a Technology Foundations course.

Table 6. ***Scholarship Funding for Workforce Development***

State	Description
Michigan	In response to the COVID-19 pandemic in 2020, Michigan established the Futures for Frontliners which allows frontline workers to attend community college for free (State of Michigan, 2021a). Michigan Reconnect provides scholarship funding for associate degrees or certificates to Michigan residents ages 25 or older who have not completed an associate or bachelor's degree (State of Michigan, 2021b).
Tennessee	The Tennessee Reconnect Grant provides funding for adults to complete an associate degree, technical degree, or technical diploma at a community or technical college in Tennessee (Tennessee Reconnect, 2021).
West Virginia	West Virginia has allocated financial aid for postsecondary noncredit vocational programs (Bishop, 2019).

Table 7. ***State Strategic Goals Concerning Short-term Credentials***

State	Description
Kentucky	The Kentucky Council on Postsecondary Education (2019) set a goal for 60% of residents to have a college credential by 2030. Between academic years 2017 and 2018, the number of short-term certificates awarded increased by 5.8%.
Utah	In 2016, Utah approved a strategic plan with three goals. One goal is "Timely Completion" within the Utah System of Higher Education, which asks institutions to create stackable pathways from certificate programs to bachelor's degrees (Utah System of Higher Education, 2017). The Utah System of Higher Education (USHE) works closely with local business leaders to create short-term certificate (16 to 29 credits) career and technical education programs that are closely aligned with workforce needs (Carruth & Palica, 2018, 2020).

Table 8. ***Exploratory Research Studies on Stackable Credentials***

State	Description
California	The Public Policy Institute of California has conducted research on stackable credentials at the community colleges (e.g., Bohn et al., 2019; Harris, 2015).
Washington	The Washington State Board of Community and Technical Colleges (2017) studied whether stackable credentials improved students' career outcomes.

Table 9. ***Miscellaneous Workforce Development Policy Initiatives***

State	Description
Colorado	In response to a labor market shortage in manufacturing, the Colorado governor directed the community colleges in 2013 to create streamlined career pathways to manufacturing careers (Perea, 2020). The community colleges embedded digital badges that specified concrete skill sets as students completed their associate degrees.
New York	Additionally, in 2021, then-Governor Andrew Cuomo announced the second round of funding for the Workforce Development Initiative, which allocates $48 million in funding for strategic workforce development efforts (Ostroff Associates, 2021).
Washington	Washington's interactive Career Bridge website allows students to find education and training programs that align with their career interests (WA Workforce Training and Education Coordinating Board, 2021). The website provides information about program length, tuition costs, entrance requirements, and other information.

Enrollment in Sub-Baccalaureate Certificate Programs

Most literature on short-term credentials focuses on credential completions rather than initial enrollment. Due to the lack of information about enrollment in short-term certificates

specifically, this section summarizes information about sub-baccalaureate certificate programs broadly, without attention to program length.

Sub-baccalaureate Certificate Enrollment by Student Demographic Characteristics

In 2016, 9% of all undergraduates were enrolled in sub-baccalaureate certificate program (Carnevale et al., 2020). The populations of students enrolled in sub-baccalaureate certificates and bachelor's degree programs differ in several ways. Students from families with lower socio-economic status, as defined by parental education and income are more likely to enroll in sub-baccalaureate certificates than their more affluent peers (Carnevale et al., 2012). Additionally, students enrolled in sub-baccalaureate certificates are more diverse with respect to race/ethnicity and age (Carnevale et al., 2020).

Using secondary data from the Beginning Postsecondary Students Study 2012-17 (BPS 12:17), 10% of first-time undergraduate students enrolled in sub-baccalaureate certificate programs (see Table 10). Patterns of enrollment by student demographics align with findings from Carnevale et al. (2012, 2020). For example, women enrolled at a higher rate than men (11% vs. 7%). Asian students and international students were least likely to be enrolled in certificate programs (3%), while American Indian or Alaska Native students were most likely (22%). There is also a direct relationship between enrollment in certificates and income, with lower income students being most likely to enroll in certificates and higher income students being least likely (14% vs. 5%). Students who primarily speak Spanish have above average rates of enrollment in certificates (17%). Veterans and first-generation college students have higher enrollment rates in certificates than non-veterans (18% vs. 9%) and continuing-generation

college students (16% vs. 8%), respectively. The rate of enrollment in certificates is similar for students with and without disabilities (11% vs. 10%).

Table 10. ***Percent of Undergraduates by Program in 2011-12***

	Total	Certificate	Associate degree	Bachelor's degree	No program
Total	100.0	9.6	41.9	47.2	1.3
Gender					
Male	100.0	7.2	44.5	47.1	1.2
Female	100.0	11.4	40.0	47.2	1.4
Race/ethnicity					
White	100.0	7.6	39.4	51.7	1.3
Black or African American	100.0	11.7	46.3	41.3	0.7
Hispanic or Latino	100.0	15.6	49.7	32.8	1.9
Asian	100.0	2.7	32.3	62.2	2.8
American Indian or Alaska Native	100.0	21.5	43.8	34.7	‡
Native Hawaiian/other Pacific Islander	100.0	9.1	48.4	42.5	‡
More than one race	100.0	8.2	37.9	53.0	0.8
International students	100.0	2.9	35.9	60.5	‡
Income group					
Low-income group	100.0	13.9	47.0	38.7	0.5
Low middle-income group	100.0	11.8	47.4	39.5	1.4
High middle-income group	100.0	7.3	43.0	48.2	1.5
High income group	100.0	5.3	30.4	62.4	1.9
Disability					
Has disability	100.0	10.5	49.2	39.8	0.5
No reported disability	100.0	9.5	41.0	48.1	1.4
Primary language spoken					
English	100.0	9.1	40.8	48.9	1.2
Spanish	100.0	17.4	50.9	30.1	1.6
English and Spanish equally	100.0	12.9	53.8	31.3	2.0
Another language	100.0	7.5	45.0	45.9	1.5
Equal mix of English/another language	100.0	3.4	32.8	60.4	3.5
Veteran status					
Veteran	100.0	18.3	63.2	17.8	‡
Not a veteran	100.0	9.4	41.6	47.6	1.3
First immediate family member to go to college					
Yes	100.0	16.4	52.5	30.1	0.9
No	100.0	7.7	39.2	51.7	1.4
Do not know family's education level	100.0	20.6	54.2	22.6	2.6

Note. These data are from the Beginning Postsecondary Student Study (BPS:12/17) conducted by the National Center for Education Statistics. The symbol ‡ indicates that NCES reporting standards were not met, meaning that the cell size was low.

The Intersection of Sub-baccalaureate Field of Study and Student Demographics

Students enrolled in sub-baccalaureate certificates study a range of fields (see Tables 11 through 13). Among students enrolled in undergraduate certificate programs in 2011-12, the most common field of study was health care (44%), followed by personal and consumer services (21%) and manufacturing, construction, repair, and transportation (17%).

There are differences in the field that students enroll in by student demographic characteristics (see Tables 11 through 13). Women (57%), American Indian/Alaska Native students (77%), Hispanic/Latinx students (55%), low-income students (47%), first-generation college students (49%), students who primarily speak Spanish (52%), and students who speak Spanish and English equally (62%) have higher than average rates of enrollment in health care certificates. Men (49%), White students (36%), and veterans (39%) have higher than average rates of enrollment in manufacturing, construction, repair, and transportation certificates. Asian students were much more likely than the overall cohort to enroll in engineering certificates (29% vs. 4%). Women (28%), students with disabilities (27%), students reporting more than one race (26%), and low-income students (26%) also have higher than average enrollment in personal care certificates.

Table 11. ***Percent of Undergraduate Certificate-Seeking Students Enrolled in the Following Fields of Study in 2011-12 by Gender and Race/Ethnicity***

		Gender		Race/Ethnicity							
	Total	Male	Female	White	Black/ African American	Hispanic/ Latinx	Asian	American Indian or Alaska Native	Native Hawaiian/ other Pacific Islander	More than one race	International
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture & natural resources	0.2	0.6	‡	0.2	‡	‡	‡	‡	‡	‡	‡
Biological & physical science, science tech	0.2	0.3	0.2	0.3	0.4	0.1	‡	‡	‡	‡	‡
Business	4.0	3.5	4.3	3.3	7.3	3.1	‡	‡	‡	7.4	‡
Communications	0.1	0.1	0.0	0.1	0.2	‡	‡	‡	‡	‡	‡
Computer & information sciences	1.3	3.6	0.2	1.7	0.8	1.3	‡	‡	‡	0.9	‡
Design & applied arts	0.8	0.4	1.0	1.3	0.9	‡	‡	‡	‡	‡	‡
Education	2.3	‡	3.4	1.9	4.8	1.8	‡	‡	‡	‡	‡
Engineering & engineering technology	3.7	10.0	0.7	4.2	2.3	3.0	28.8	‡	‡	4.7	‡
General studies & other	0.8	1.1	0.6	1.1	‡	0.3	‡	‡	‡	‡	‡
Health care fields	43.8	15.7	57.3	35.8	41.7	55.0	35.1	76.8	‡	37.0	‡
Humanities	0.9	1.7	0.5	1.7	0.2	‡	‡	‡	‡	‡	‡
Law & legal studies	0.3	‡	0.5	0.3	‡	0.6	‡	‡	‡	‡	‡
Manufacturing, construction, repair, transportation	16.6	49.1	0.8	21.7	15.1	11.4	5.5	11.9	‡	13.2	‡
Military technology & protective services	1.7	4.0	0.5	1.8	0.9	1.9	‡	‡	‡	2.2	‡
Personal & consumer services	21.0	5.6	28.4	21.5	23.1	19.4	24.9	7.1	‡	26.0	‡
Psychology	0.1	‡	0.1	‡	‡	‡	‡	‡	‡	‡	‡
Public administration & human services	0.3	‡	0.4	0.2	1.2	‡	‡	‡	‡	‡	‡
Social sciences	0.2	‡	‡	‡	‡	‡	‡	‡	‡	‡	‡
Undecided or Undeclared	1.7	3.6	0.7	2.8	0.6	0.8	‡	‡	‡	‡	‡

Note. These data are from the Beginning Postsecondary Student Study (BPS:12/17) conducted by the National Center for Education Statistics. The symbol ‡ indicates that NCES reporting standards were not met, meaning that the cell size was low

Table 12. ***Percent of Undergraduate Certificate-Seeking Students Enrolled in the Following Fields of Study in 2011-12 by Income Group and Family Educational Background***

		Income Group				First in Immediate Family to Attend Postsecondary Education		
	Total	Low	Low middle	High middle	High	Yes	No	Family's education unknown
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture & natural resources	0.2	‡	0.5	‡	‡	0.6	‡	‡
Biological & physical science, science tech	0.2	0.4	‡	‡	‡	0.3	0.2	‡
Business	4.0	2.7	3.4	8.7	2.5	3.2	3.5	15.7
Communications	0.1	‡	0.1	‡	‡	‡	0.1	‡
Computer & information sciences	1.3	2.0	0.8	1.1	1.3	1.3	0.8	8.1
Design & applied arts	0.8	0.7	0.3	0.8	2.3	0.4	1.0	‡
Education	2.3	3.2	0.3	4.0	1.9	1.8	2.6	‡
Engineering & engineering technology	3.7	1.5	4.8	5.4	4.8	3.5	3.9	2.8
General studies & other	0.8	0.7	0.8	1.2	‡	1.0	0.6	‡
Health care fields	43.8	46.7	46.6	38.3	37.3	48.9	42.8	24.3
Humanities	0.9	0.2	0.3	2.8	1.4	0.7	1.1	‡
Law & legal studies	0.3	0.1	0.4	‡	1.3	0.5	0.3	‡
Manufacturing, construction, repair, transportation	16.6	13.8	17.9	16.4	21.4	15.8	16.0	29.2
Military technology & protective services	1.7	1.0	1.7	1.9	3.1	2.2	1.3	‡
Personal & consumer services	21.0	26.2	21.1	15.5	14.4	18.0	22.8	14.7
Psychology	0.1	‡	‡	‡	‡	‡	0.0	‡
Public administration & human services	0.3	0.2	‡	‡	1.2	‡	0.4	‡
Social sciences	0.2	0.3	‡	‡	‡	‡	0.1	‡
Undecided or Undeclared	1.7	0.2	0.4	3.4	5.8	1.1	2.0	‡

Note. These data are from the Beginning Postsecondary Student Study (BPS:12/17) conducted by the National Center for Education Statistics. The symbol ‡ indicates that NCES reporting standards were not met, meaning that the cell size was low

Table 13. ***Percent of Undergraduate Certificate-Seeking Students Enrolled in the Following Fields of Study in 2011-12 by Disability, Primary Language Spoken, and Veteran Status***

		Disability		Primary Language Spoken				Veteran	
	Total	Has disability	No disability	English	Spanish	English & Spanish equally	Another language	Veteran	Not a veteran
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture & natural resources	0.2	‡	0.2	0.1	‡	‡	‡	‡	0.2
Biological & physical science, science tech	0.2	‡	0.2	0.2	‡	‡	‡	‡	0.2
Business	4.0	1.8	4.3	4.3	1.8	9.0	‡	‡	4.1
Communications	0.1	‡	0.1	0.1	‡	‡	‡	‡	0.1
Computer & information sciences	1.3	4.0	0.9	1.0	0.8	1.5	‡	‡	1.4
Design & applied arts	0.8	1.7	0.7	1.0	‡	‡	‡	‡	0.8
Education	2.3	‡	2.6	2.5	2.1	‡	‡	‡	2.4
Engineering & engineering technology	3.7	4.2	3.7	3.3	5.6	‡	10.2	10.7	3.5
General studies & other	0.8	2.3	0.5	0.9	‡	‡	‡	‡	0.8
Health care fields	43.8	35.4	44.9	41.1	52.0	61.8	49.4	44.3	43.7
Humanities	0.9	3.3	0.6	1.0	‡	‡	‡	‡	0.9
Law & legal studies	0.3	‡	0.4	0.3	‡	‡	‡	‡	0.3
Manufacturing, construction, repair, transportation	16.6	14.9	16.8	17.9	15.3	4.1	10.2	39.1	15.9
Military technology & protective services	1.7	2.2	1.6	1.7	2.9	‡	‡	‡	1.7
Personal & consumer services	21.0	26.5	20.2	21.9	16.8	18.0	16.8	1.6	21.5
Psychology	0.1	‡	0.1	0.1	‡	‡	‡	‡	0.0
Public administration & human services	0.3	‡	0.4	0.4	‡	‡	‡	‡	0.3
Social sciences	0.2	‡	‡	‡	‡	‡	‡	‡	0.2
Undecided or Undeclared	1.7	2.5	1.5	2.1	0.1	‡	‡	‡	1.7

Note. These data are from the Beginning Postsecondary Student Study (BPS:12/17) conducted by the National Center for Education Statistics. The symbol ‡ indicates that NCES reporting standards were not met, meaning that the cell size was low

Sub-baccalaureate Certificate Enrollment by Sector

While this report focuses on certificates awarded by community colleges, students can also enroll in sub-baccalaureate certificate programs at for-profit private institutions. Using data from the Beginning Postsecondary Student Study 2004-09 (BPS:04/09), McKinney et al. (2017) found that a higher proportion of students enrolled in a certificate program at for-profit institutions were female (74%) and students of color (64%). Moreover, the highest proportion of certificate students at for-profit institutions were in the bottom income quartile (59%). Additionally, for-profit certificate students tended to be enrolled full-time (87%) and did not work while enrolled (45%) relative to those attending public institutions.

SUB-BACCALAUREATE CERTIFICATE PROGRAM ACADEMIC OUTCOMES

There are multiple lenses from which to examine certificate students' academic outcomes. The first section below examines student persistence in certificate programs, while the second section examines the total number of certificate completions.

Student Persistence in Sub-baccalaureate Certificate Programs

Student persistence was examined using data from the NCES Beginning Postsecondary Students Study 2012-17 (see Table 14). The persistence rate was defined as the proportion of students attaining a certificate and/or a degree (associate/bachelor's) at their first institution *within two years* of beginning their certificate program.

Table 14. ***Percent of Undergraduate Certificate-Seeking Students who Attained a Certificate after Two Years***

	Total	Attained certificate	Attained associate or bachelor's degree	No degree, still enrolled	No degree, left institution
Total	100.0	40.2	0.6	10.2	49.0
Gender					
Male	100.0	38.3	1.2	10.3	50.2
Female	100.0	41.1	0.3	10.2	48.4
Race/ethnicity					
White	100.0	43.2	0.9	11.4	44.5
Black or African American	100.0	29.2	0.3	9.5	61.1
Hispanic or Latinx	100.0	41.4	0.5	8.9	49.3
Asian	100.0	17.3	‡	13.4	68.7
American Indian or Alaska Native	100.0	56.0	‡	2.0	42.1
Native Hawaiian/other Pacific Islander	100.0	‡	‡	‡	‡
More than one race	100.0	44.6	‡	11.0	44.4
International students	100.0	‡	‡	‡	‡
Income group					
Low-income group	100.0	35.3	0.8	7.7	56.2
Low middle-income group	100.0	46.5	0.2	10.0	43.3
High middle-income group	100.0	35.7	1.1	14.1	49.1
High income group	100.0	45.1	0.2	12.0	42.6
Disability					
Has disability	100.0	38.8	‡	8.3	52.7
No reported disability	100.0	40.4	0.7	10.5	48.5
Primary language spoken					
English	100.0	40.2	0.7	10.6	48.5
Spanish	100.0	45.4	0.5	7.3	46.8
English and Spanish equally	100.0	26.5	‡	9.5	64.0
Another language	100.0	41.1	‡	11.4	47.3
Equal mix of English/another language	100.0	‡	‡	‡	‡
Veteran status					
Veteran	100.0	50.0	‡	8.1	41.6
Not a veteran	100.0	39.9	0.6	10.3	49.2
First immediate family member to go to college					
Yes	100.0	35.9	0.3	12.2	51.7
No	100.0	42.7	0.8	9.6	47.0
Do not know family's education level	100.0	33.2	‡	7.3	59.4

Note. These data are from the Beginning Postsecondary Student Study (BPS:12/17) conducted by the National Center for Education Statistics. The symbol ‡ indicates that NCES reporting standards were not met, meaning that the cell size was low

The overall two-year persistence rate for the cohort entering in 2011-12 was 41% (see Table 14). The persistence rate was lower than average for Black or African American students (30%), Asian students (17%), students in the low-income group (36%), students in the high middle-income group (37%), students who were the first in their immediate family to attend college (36%), and students who speak English and Spanish equally (27%)

McKinney et al. (2017) examined differences in persistence by sector using data from the Beginning Postsecondary Students Study 2004-09 (BPS 04:09). In contrast to my analysis, McKinney et al.'s examined persistence *six years* after students first enrolled in a certificate program. Specifically, those starting at for-profit institutions had the lowest rate of completing the credential. Interestingly, the attainment and dropout rates for students attending community colleges (attainment: 57%, dropout: 33%) and for-profit (attainment: 55%, dropout: 36%) institutions were similar. In comparison, the attainment rate was highest (68%) for students beginning the certificate at a public career and technical center and the dropout rate was the lowest (27%).

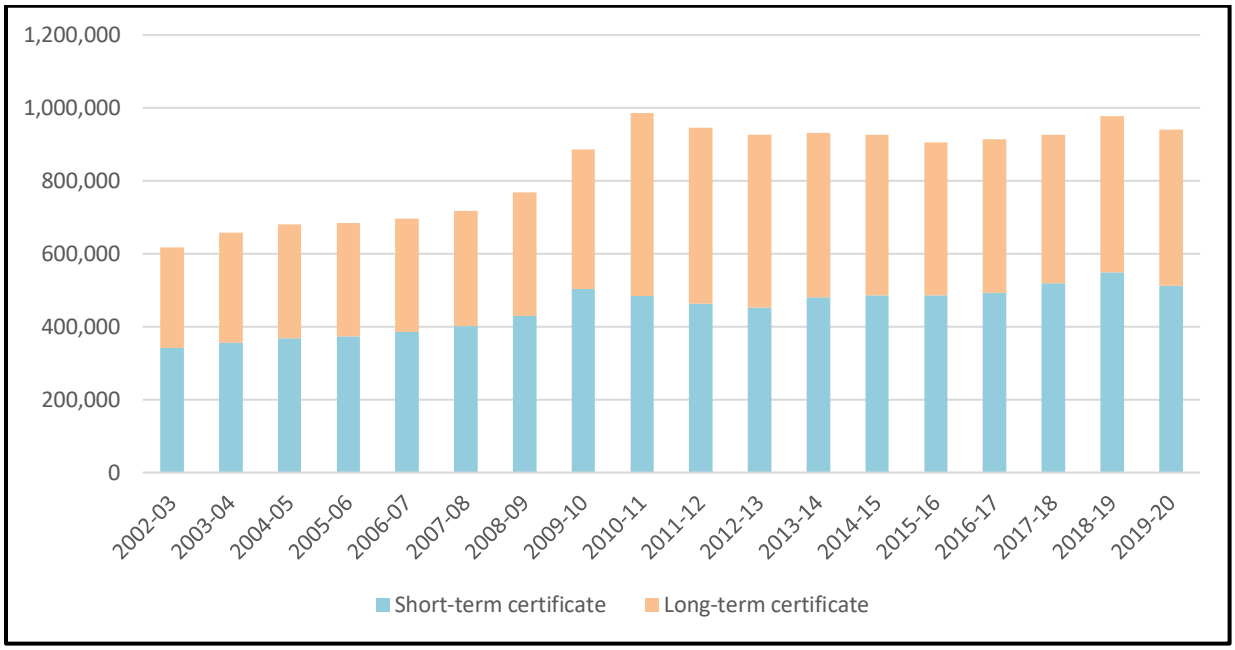
Sub-baccalaureate Certificates Awarded

Thirteen percent of students who *received* an undergraduate credential in 2015-16 earned a sub-baccalaureate certificate (Taylor et al., 2020), with the remainder earning associate or bachelor's degrees. Approximately 2.8 million sub-baccalaureate certificates were awarded between 2015 and 2017 (Taylor et al., 2020). Between 2015 and 2017, the highest proportion of sub-baccalaureate certificates were awarded in health science (33%), followed by human services (13%); manufacturing (9%); transportation, distribution, and logistics (9%); and education and training (8%). Less than one percent of certificates were awarded in agriculture,

food, and natural resources (0.9%); STEM (0.8%); marketing (0.6%); and government and public administration (0.1%).

The total number of sub-baccalaureate certificates awarded increased 52% from 618,387 in 2002-03 to 940,625 in 2019-20 (see Figure 3). The number of *short-term certificates* awarded increased 50% from 342,589 to 512,799 during this period.

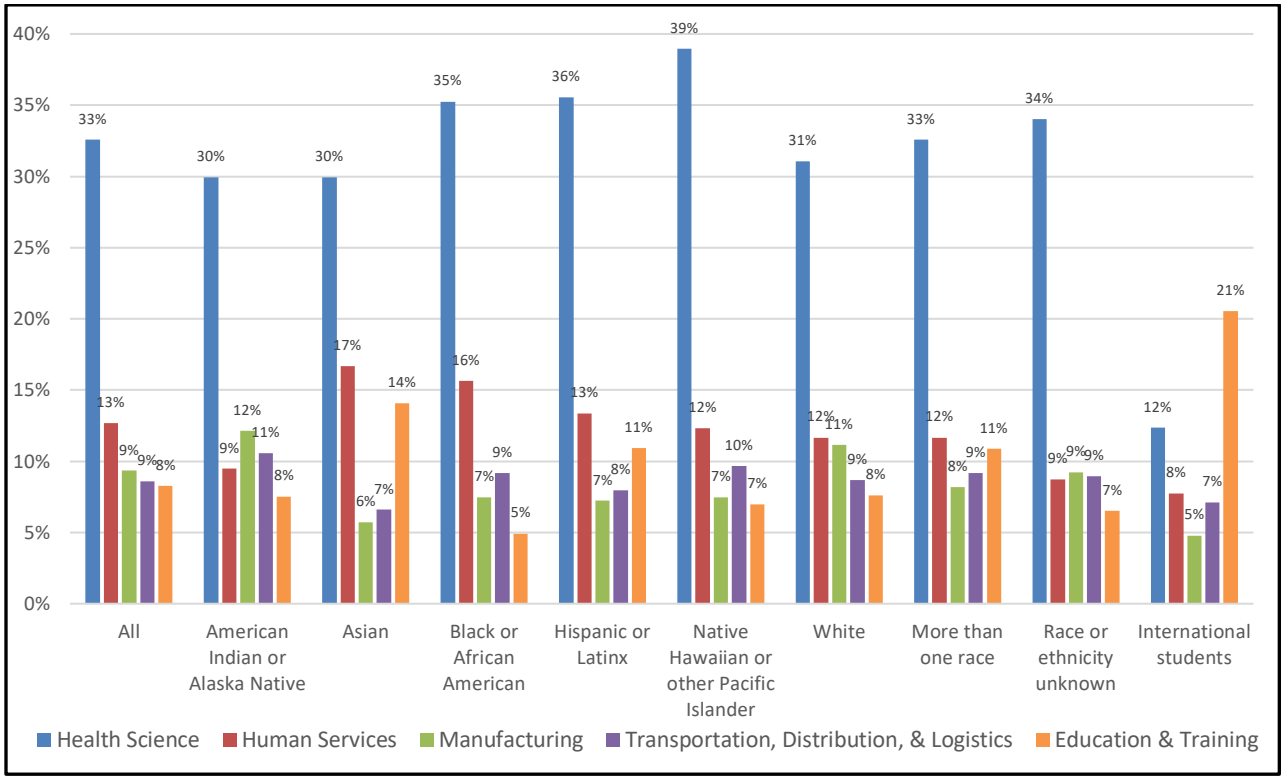
Figure 3. ***Trends in Sub-baccalaureate Certificates Awarded between 2002-03 and 2019-20***



Note. Long-term certificates are sub-baccalaureate credentials lasting more than one year but less than two years. These data are from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Figure 4 below shows the top five certificate fields overall and the proportion of students earning a certificate in each of these five fields by race/ethnicity (Taylor et al., 2020). Native Hawaiian and other Pacific Islanders were most likely to earn a certificate in health sciences (39%) while international students were least likely (12%). In contrast, 21% of international students earned a certificate in education and training compared to only 8% of all students.

Figure 4. ***Top Sub-baccalaureate Certificate Fields by Race/Ethnicity***



Note. These data are from Taylor et al. (2020) who used data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), 2015-2017.

Completions also differed by gender with women being most likely to earn a certificate in health science (47.4%) and men most likely to earn a certificate in manufacturing (19.9%) (Taylor et al., 2020).

Stackable Credential Completions

In addition to general enrollment in certificates, there is also interest in whether students are stacking credentials. Using data from the 2014-15 National Student Clearinghouse academic cohort, Bailey and Belfield (2017a) found that 80% of undergraduate certificates were awarded to people without any previous awards. A small proportion of students earning associate degrees (8%) and bachelor's degrees (1%) had previously earned a certificate. Additionally, 10% of students earned a certificate after previously earning another certificate. Combined, these data suggest that some students are earning multiple credentials. Yet, this limited information does not provide clear evidence concerning whether the credentials build on one another in a coherent pathway – i.e., student earns a certificate and then an associate degree without losing any credits.

Using a second data set, transcript data from the National Longitudinal Survey of Youth (NLSY 97), Bailey and Belfield (2017a) examined educational attainment by age 31 among individuals attending college (n=3,818). Approximately 7.3% earned a certificate. In total, 3.1% completed a stacked credential of any type. Only 0.3% stacked multiple independent credentials. With respect to progression stacks, 0.3% and 0.4% completed an associate or bachelor's degree, respectively, after earning a certificate. Finally, 1.0% and 0.9%, respectively, earned a supplemental stack, which included a certificate after first completing an associate or bachelor's degree.

Bailey and Belfield (2017a) also examined vocational awards using the NLSY 97 data, which included vocational certificates, medical certificates, vocational licenses, and

competency-based certificates. When including vocational awards within the broader umbrella of postsecondary certificates, 31% of college students stack credentials; 9% completed more than one vocational award; and 4% completed a vocational award and a certificate. The authors did not distinguish the order in which a vocational award and degree were completed, but 6% completed a progression/supplemental stack consisting of a vocational award and an associate degree, while 14% completed a progression/supplemental stack consisting of a vocational award and a bachelor's degree. Overall, there is some evidence to suggest that students are stacking credentials.

Transfer and Bachelor's Degree Attainment

Another important outcome for students completing a short-term credential is whether they transfer to a four-year college and earn a bachelor's degree. Lin et al. (2020) examined these outcomes by race/ethnicity. Among credential-seeking community college students, Black students were more likely than White students to stop out of community college for more than four terms, less likely to transfer to a four-year institution, and less likely to obtain a bachelor's degree (Lin et al., 2020). Women of each racial/ethnic group were more likely than men of the same racial/ethnic group to transfer to a four-year college and complete a credential (Lin et al., 2020). Black and White students from lower-income backgrounds were less likely to transfer and earn a credential relative to more economically well-off students of the same race. Contrary to some of the espoused hope that completing a certificate will increase students'

likelihood of earning a more advanced credential, Lin et al. found that community college students who completed a certificate were *less* likely to transfer or earn a bachelor's degree.

Loan Outcomes for Sub-baccalaureate Certificate Students

Monitoring student loan debt for those enrolled in short-term certificate programs is especially important since a high proportion of certificate students are low income relative to those in other undergraduate programs (Carnevale et al., 2012). Moreover, there is also concerning evidence that for-profit providers engage in exploitive practices when working with inner-city Black students (Holland & DeLuca, 2016). While Holland and DeLuca (2016) focused on the experiences of inner-city Black students, these exploitative practices likely extend to other student populations.

McKinney et al. (2017) examined differences in students' financial outcomes by sector. During the 2003-2004 academic year, the average net cost for sub-baccalaureate certificates, after financial aid, was much higher at for-profit institutions ($5,385), compared to career and technical centers ($1,132) and community colleges ($685) (McKinney et al., 2017). For-profit certificate students had much higher rates of borrowing federal loans (85%) compared to the certificate students at community colleges (28%) and career and technical centers (24%). Among those who borrowed, the average loan amount in 2003-2004 was $4,010 for for-profit students; $4,612 for career and technical center students; and $2,479 for community college certificate students. By 2009, 21% of for-profit school certificate students defaulted on their loans compared to 6% of community college certificate students and 1% of career and technical

center students (McKinney et al., 2017). Hence, students who enroll in certificates at for-profit institutions invest higher amounts of money to complete the certificate and are seemingly more likely to encounter financial difficulties repaying their loans. Since McKinney et al. used BPS 2004-09 data, a follow-up study using more recent data is needed.

Short-Term Certificate Labor Market Outcomes

This section presents a synthesis of the labor market outcomes for students completing short-term credential programs, specifically students enrolled in certificate programs. More details on each individual study are presented in Appendix A.

General Overview of Economic Returns

One of the earliest analyses of the economic returns to certificates was conducted by Grubb (1997) who found that students who completed a certificate had significantly higher earnings. Since then, only a few studies have found that completing a short-term certificate is associated with economic earnings growth (Bahr, 2016; Giani & Fox, 2017; Xu & Trimble, 2016).

However, this earnings growth from short-term certificates is conditional. In one study, there was growth only when the short-term certificate met a specific threshold number of credits (Giani & Fox, 2017). In a second study, Xu and Trimble (2016) found that when conditioned on employment, there was no economic earnings benefit to completing a short-term certificate in North Carolina. The economic benefits of a certificate depend on the school that awarded the credential due to the costs associated with completing the credential at a public institution compared to a for-profit institution (Carnevale et al., 2012).

Additionally, certificates' labor market value varies across states (Carnevale et al, 2012). In South Carolina, only 41% of certificates have significant earnings returns, compared to 65% of certificates in North Dakota, Rhode Island, and Montana.

While short-term certificate programs might have some earnings power, the economic gains are low compared to other undergraduate programs. For example, in California, Bohn et al. (2019) found that the average percentage wage increase for a short-term certificate was 8%, which was much lower than for both long-term certificates (21%) and associate degrees (32%). Importantly, while the economic returns to associate degrees remain strong over time, the economic returns for short-term certificates decline (Bahr, 2016).

The evidence concerning whether a short-term certificate improves the odds of employment is also mixed. Dadgar and Trimble (2015) and Giani and Fox (2017) found no relationship between earning short-term certificates and odds of employment. However, Xu and Trimble (2016) found a six percent and three percent increase in the likelihood of employment in North Carolina and Virginia, respectively.

Differences in Labor Market Outcomes by Gender

There is clear evidence of gender differences in the economic benefits of short-term certificates. However, some evidence suggests that women have lower returns, on average, than men (Bahr et al., 2015; Ositelu, 2021), but other studies indicate that women have higher economic returns (Belfield & Bailey, 2017a, 2017b; Minaya & Scott-Clayton, 2017). One study found equal returns for men and women (Jepsen et al., 2014). Bohn et al. (2019) found that it

took women eight quarters to earn middle-income wages after earning a short-term credential whereas it took men only one quarter.

Differences in Labor Market Outcomes by Race/Ethnicity

There are differences in economic returns to short-term certificates by race and ethnicity (Bohn et al., 2019; Ositelu, 2021). For example, Black and Latinx adults with a short-term certificate earn lower median incomes than White adults (Ositelu, 2021). Moreover, Bohn et al. (2019) found that Black and Latinx students in California tend to receive lower returns on their investment relative to White and Asian students, but some of these differences could be explained by differences in field of study. Moreover, Bohn et al. found that it took Black short-term credential earners six quarters to earn middle-income wages, compared to only three quarters for White students completing a short credential.

Differences in Labor Market Outcomes by the Intersection of Gender and Race/Ethnicity

There are also differences in labor market outcomes that differ by the intersection of gender and race/ethnicity. In one study, Bahr (2016) found that across all racial/ethnic groups, men had stronger economic returns for short-term certificates (6 to 29 credits). For example, the average change in quarterly earnings was $187.88 for White men and $19.20 for White women. Moreover, only White men, White women, and Hispanic/Latinx women experienced significant returns to low-credit awards less than 6 credits.

Differences in Labor Market Outcomes by Field of Study

There are substantial differences in economic returns to short-term certificates across fields of study (Bahr, 2016; Belfield & Bailey, 2017a, 2017b; Carnevale et al., 2012, 2020).

Studies have found high rates of quarterly earnings return in public and protective services (Bahr, 2016), biological sciences (Bahr, 2016), health-related fields (Belfield & Bailey, 2017a, 2017b), and engineering technologies (Carnevale et al., 2012, 2020). Yet, it is especially concerning that some short-term credential fields have *negative returns*, including education, fine and applied arts, and interdisciplinary studies (Bahr, 2016).

Differences in Labor Market Outcomes by Employment Field

Students who find employment in a field directly connected to their credential have higher earnings relative to those employed in another field (Carnevale et al., 2012; Grubb, 1997). Specifically, Carnevale et al. (2012) found that certificate holders who work in the same field as their certificate earn 37% more than individuals who work outside the field. Moreover, certificate holders who work outside of their field of study experience minimal economic benefits, since they earn only 1% more on average than adults whose highest educational credential is a high school diploma. Since only 44% of certificate holders work in the field of their certificate (Carnevale et al., 2012), there are barriers to obtaining economic benefits from certificates.

Differences in Labor Market Outcomes by the Intersection of Gender, Race/Ethnicity, Field of Study, and Employment Field

There is a clear intersection among gender, race/ethnicity, field of study, and economic returns on certificates. Carnevale et al. (2012) examined certificates in 14 fields of study and found that 12 out of 14 fields were highly segregated by sex, meaning that 75% of certificate holders were men or 75% of certificate holders were women, depending on the field. Due to

this stratification in certificate completion by gender, women tended to complete certificates that were associated with an earnings increase of 16% over a high school diploma (Carnevale et al., 2012). In comparison, men tended to complete certificates with an associated earnings increase of 27% – over 10 percentage points higher for men than women. Similarly, women and racial/ethnic minorities are overrepresented among those completing health care short-term certificates which have the lowest annual earnings for short-term certificates (Ositelu, 2021).

In some fields, such as computer and information services, men and women certificate holders can earn more than associate and bachelor's degree holders when they are employed in their field of study (Carnevale et al., 2012). However, men earn higher annual salaries on average than women ($72,498 vs. $56,664) and are more likely to obtain jobs (24% vs. 7%) in computer and information services.

Labor Market Returns to Stacking Credentials

Researchers and policymakers are also interested in the effect of stacking credentials on students' labor market outcomes. There are methodological challenges to examining whether there are economic returns to stackable credentials. For example, in their research, Bailey and Belfield (2017b) found that it was not possible to distinguish among supplemental, progression, and independent stacks, in terms of their earning power.

There are two studies, however, that provide some initial insight on stacked credentials. In the first study, Bohn et al. (2019) found that stacked credentials are associated with increased earnings power, but it takes longer for these students to earn middle-income wages

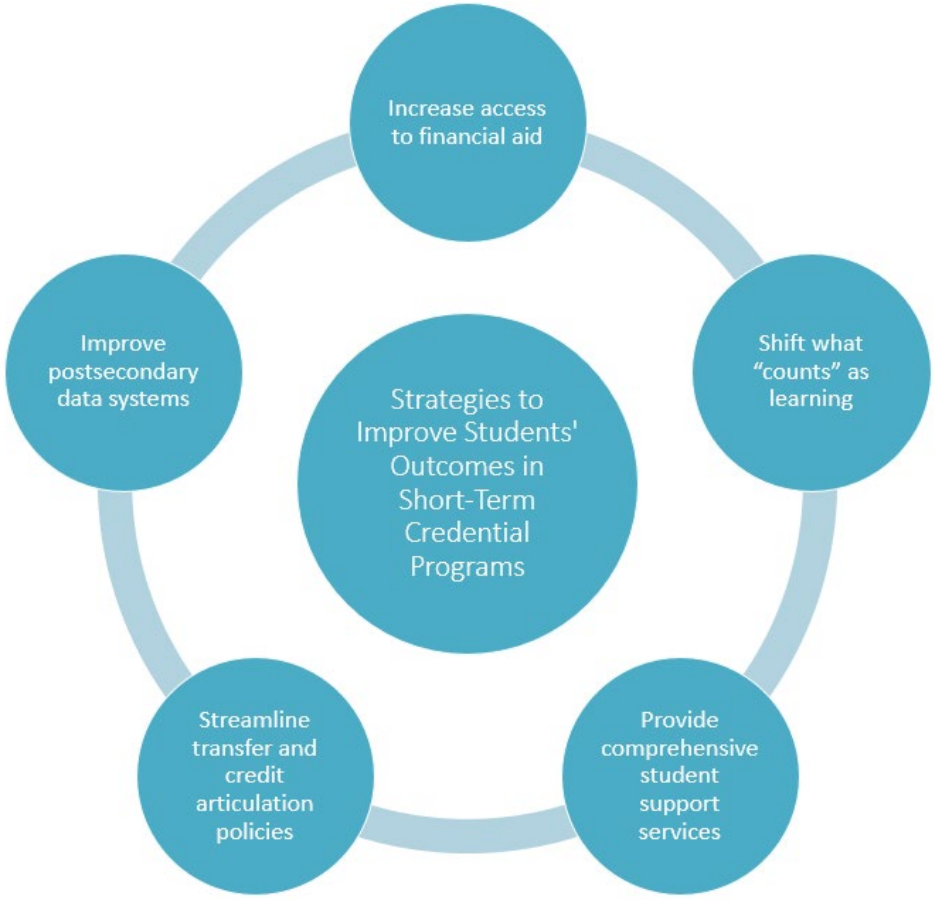
on par with students who completed a single associate degree. In the second study, Bailey and Belfield (2017b) found weak returns to stackable credentials, such that there appeared to be no additional labor market value earned from one credential relative to multiple stacked credentials.

Bailey and Belfield (2017b) caution that simply earning multiple awards on top of one another should not count as stacking credentials, unless each credential adds to the earnings power of the ones that precede it. Moreover, the earnings power of the full suite of credentials should have additional earnings power above and beyond the independent effects of each one. In essence, there should be an extra booster effect upon receiving all credentials in a stack. Furthermore, because students might temporarily leave the labor market to earn a credential or reduce their hours, the credential should offset these opportunity costs.

Strategies to Improve Students' Outcomes in Short-term Credential Programs

The current section provides five recommended strategies for improving students' outcomes in short-term credential programs, with a focus on certificate programs. An overview of these strategies is presented in Figure 5. Each strategy is discussed in greater detail below.

Figure 5. ***Recommended Strategies to Improve Students' Outcomes in Short-Term Credential Programs***



Increase Access to Financial Aid

Students enrolled in short-term programs, especially noncredit programs, have limited access to financial aid (Bishop, 2019). Current Pell Grant eligibility limits the grants to students enrolled in an undergraduate credential program lasting at least one semester (Thomas et al., 2021). While the cost of attaining a short-term program is lower than a degree, the costs are sometimes high enough to discourage students from enrolling (Brock, 2021). Expanding Pell

Grant eligibility to prospective short-term credential students might increase enrollment and ultimately credential attainment (Brock, 2021; Garcia, 2018).

There is emerging empirical evidence that expanding Pell Grants has a positive impact on students' outcomes. In 2011, the U.S. Department of Education conducted two experimental studies in which Pell Grants were (1) expanded to bachelor's degree holding, income-eligible students to obtain Pell Grants for short-term occupational training programs (Experiment 1) and (2) for income-eligible students to receive Pell Grants for short programs lasting as few as eight weeks (Experiment 2) (Thomas et al., 2021). In the first experiment, Pell Grants increased enrollment by 26 percentage points and completion by 17 percentage points. Similarly, in the second experiment, students offered Pell Grants were 15 percentage points more likely to enroll in a program and 9 percentage points more likely to complete the credential. In a related study, Liu (2020) found that low-income students who enrolled in a short-term credential program and received an experimental year-round Pell Grant were more likely to earn a certificate and an associate degree relative to students who did not receive the year-round funding. Findings from both studies suggest that increasing access to Pell Grants might increase students' attainment of educational credentials.

While expanding Pell grants is one promising option, Brock (2021) argues that states can also provide funding to support students enrolled in short-term programs. Some states, such as West Virginia, have already allocated financial aid for postsecondary noncredit vocational programs (Bishop, 2019).

Shift What "Counts" as Learning

Klein-Collins and Travers (2020) call for a more flexible approach to rewarding students' learning and academic progress toward postsecondary credentials. For example, Prior Learning Assessments can be used to recognize learning that occurred outside of the traditional classroom environment. This adjustment requires a change in institutional culture, which currently prioritizes in-person traditional classroom learning. Indeed, this philosophy is a key part of the Lumina Foundation Strategic Plan 2013 to 2016, which argues for more emphasis on competencies and learning defined more broadly than credit hours earned in a classroom (Lumina Foundation, 2013). This policy shift will provide more opportunities for adults to receive credit for their outside of class experiences, such as employment-related learning.

Provide Comprehensive Student Support Services

A comprehensive, wraparound service approach to supporting students enrolled in short-term credential programs can better ensure that students will successfully complete their credential, secure employment, and transfer to an associate or bachelor's degree (Brock, 2021; Carnevale et al., 2012; Kazis & Leasor, 2021). Virginia's FastForward and Tennessee's Technology Centers are exemplars for how such wraparound services can lead to successful student outcomes (see Tables 3 and 5, respectively). It is essential to ensure that adult learners have access to appropriate support services throughout the duration of their program as they ultimately seek further credentials (Brock, 2021).

These support services can come from the institution and community-based partnerships. Students who enroll in short-term credential programs tend to be more

academically underprepared relative to students in associate degree programs (Audant, 2016). Support services are thus needed with respect to tutoring, as well as credit transfer, financial aid, career development, and academic advising (Brock, 2021). Brock (2021) also recommends that community colleges partner with public agencies and community-based organizations to better ensure that students have access to childcare, housing, food, and transportation, which might otherwise hinder them from attending class and completing their credential.

In addition to support services, institutions can also support students through their campus culture. The population of students enrolled in short-term programs is diverse. According to Brock (2021), community colleges must become more culturally responsive to the diversity of their adult learner population to ensure that short-term credential students feel a sense of belonging to their institution. Brock recommends that spaces on campus be designated for cultural groups. Indeed, Museus's (2014) model of Culturally Engagement Campus Environments maintains that culturally validating postsecondary environments improve students' sense of belonging and ultimately their persistence.

Streamline Transfer and Credit Articulation Policies

One purported strength of short-term credentials is that they can be stacked to a higher credential. However, to better realize this vision, transfer policies and credit articulation policies must be strengthened and simplified so students are not discouraged from seeking a higher credential due to bureaucratic complexities (Brock, 2021). Brock (2021) recommends that short-term credentials should be integrated into statewide transfer systems and articulation policies. Ohio provides an example of how a state higher education system can

articulate such policies (Ohio Department of Higher Education, 2021). These policies will better ensure that students' prior earned credits will be valuable at other institutions.

Improve Postsecondary Data Systems

Policymakers, higher education administrators, and prospective students need more data on students' outcomes in short-term credential programs, including their immediate and long-term wages and educational trajectories (Kazis & Leasor, 2021; Lumina Foundation, 2020). A unified data system across public institutions is essential for tracking students' progress over time. Thus, Brock (2021) recommends that nondegree programs be included within each state's broader postsecondary data system. Only 13 states collect data (as of 2018) on *noncredit* certificates awarded from public institutions in the state (Brock, 2021). Additionally, these data collection efforts must be detailed enough to allow for disaggregation by student characteristics including, but not limited to, race/ethnicity, gender, and age. State and federal data collection efforts are (generally) not structured for the types of sophisticated analyses that researchers would like to conduct, such as examining the cumulative economic benefits of stackable credentials (e.g., Bailey & Belfield, 2017b).

Opportunities for Further Research and Exploration

While much can be learned from the literature review above and supplementary analyses of secondary data, there are several gaps in the literature worth highlighting. These gaps present opportunities for future research.

1. Most research pertains to credit-bearing certificate programs in community colleges. There is limited research on *noncredit* programs of all types, including workforce training programs offered by community colleges, bootcamp providers, and employer-sponsored training programs. In relation, as four-year institutions, such as those within the SUNY system in New York, begin offering short-term credentials, it may be worth exploring whether short-term credentials improve students' overall persistence toward a bachelor's degree. The six-year graduation rate for the 2013 cohort of first-time, full-time students was 63% (Irwin et al., 2021), which indicates that many students who start a bachelor's degree leave before finishing. Thus, even though the short-term programs at four-year institutions might be initially designed to supplement a bachelor's degree, they motivate students to persist.
2. More research is needed on stacking credentials. As researchers have pointed out (e.g., Bailey & Belfield, 2017b), current data systems impede researchers' ability to identify students' progression along a pathway of stacked credentials. Nonetheless, public higher education systems with strategic initiatives around stacking micro-credentials (e.g., SUNY) could prioritize advances in data infrastructure to conduct sophisticated studies on students' pathways through short-term credentials and toward higher credentials.
3. Most labor market studies explore students' outcomes with respect to gender and race/ethnicity, but there are other student groups that could be explored such as students with disabilities and English language learners. There might be barriers to

accessing certain types of demographic data. Thus, this might also be a line of inquiry that would benefit from improved data systems and infrastructure.

4. My literature review lacked information about short-term credential students' psychosocial experiences at their institution. For example, how did faculty's interactions with students in short-term certificate programs influence their decision to continue in the program and possibly their decision to transfer to a four-year institution? Did students of all racial and ethnic identities feel a sense of belonging within their program?
5. There is limited information on what specific support services improve students' outcomes. Randomized control trials and/or quasi-experimental studies could be utilized to examine the impact of specific programming.

CONCLUSION

Short-term credentials have been proposed as a quick solution for addressing disparities in educational attainment, but findings from this literature review suggest that recommendation might be premature. While there is some empirical evidence that short-term credentials, namely certificates, have some labor market value, many studies also indicate that short-term credential programs have minimal labor market value. The labor market benefit of short-term credentials is also widely variable by field of study, whether the student is employed in a closely related occupational field as their certificate field of study, and student demographic characteristics, including gender and race/ethnicity. Importantly, women and

racial/ethnic minorities disproportionately complete certificates in fields of study with lower economic gains in the labor market.

Equity within the postsecondary system in the United States remains a critical problem and it is unclear whether short-term credentials are the solution. Collins and Hoffman (2021) cautioned that short-term programs might even exacerbate current inequalities. Carnevale et al. (2012) similarly question the labor market utility of certificates for women but acknowledge that they work well for men.

Dadgar and Trimble (2015) suggest that policymakers should be somewhat concerned about the rising numbers of short-term certificates given the seemingly non-existent returns on the investment (although some studies in my review found earnings gains). Indeed, Belfield and Bailey (2017a) issued a stern warning:

> Although certificates take less time to complete than associate degrees, it is unlikely that the recent growth in certificate completion can generate the same economic benefit as degree completion. An education policy that relies heavily on increased certificate completion is unlikely to be sufficient. (p. 4)

Nonetheless, policymakers, researchers, and higher education administrators can and should continue to explore short-term credentials as an avenue for increasing equity within higher education and preparing students for in-demand jobs without falling into the trap of viewing short-term credentials as a "magic bullet" for student success. It seems that – for most students in most fields – the focus should be on "stacking" short-term credentials toward an associate or bachelor's degree rather than viewing short-term credentials as the ending point.

Using short-term credentials as steppingstones towards degrees might increase persistence among students who would otherwise leave college without a degree. Moreover, short-term credentials can provide an immediate labor market credential for students seeking employment while enrolled in an associate or bachelor's degree program (Ganzglass, 2014). Importantly, despite their possible shortcomings, short-term credentials have sparked innovation in higher education and expanded our definition of what should "count" as learning.

REFERENCES

Association for Career and Technical Education (ACTE). (2011, April). *Career and technical education's role in worker retraining: Addressing the skills gap* (Issue Sheet). Retrieved from www.acteonline.org.

Audant, A. B. (2016). Stackable credentials and career/college pathways in culinary arts at Kingsborough Community College, CUNY. *Community College Journal of Research and Practice, 40*(4), 299-309. https://doi.org/10.1080/10668926.2015.1056918

Bahr, P. R. (2016). *The earnings of community college graduates in California* (Working Paper). Center for Analysis of Postsecondary Education and Employment.

Bahr, P. R., Dynarski, S., Jacob, B., Kreisman, D., Sosa, A., & Wiederspan, M. (2015). *Labor market returns to community college awards: Evidence from Michigan. A CAPSEE Working Paper*. Center for Analysis of Postsecondary Education and Employment. Retrieved from https://files.eric.ed.gov/fulltext/ED557080.pdf

Bailey, T. R., & Belfield, C. (2017a). *Stackable credentials: Awards for the future?* Community College Research Center, Teachers College, Columbia University. Retrieved from https://academiccommons.columbia.edu/doi/10.7916/D82N57KM

Bailey, T. R., & Belfield, C. (2017b). *Stackable credentials: Do they have labor market value?* Community College Research Center, Teachers College, Columbia University. Retrieved from https://academiccommons.columbia.edu/doi/10.7916/D8VM4QZR/download

Belfield, C., & Bailey, T. (2017a). Does it pay to complete community college--and how much? (Research Brief). Center for Analysis of Postsecondary Education and Employment. Retrieved from https://files.eric.ed.gov/fulltext/ED574807.pdf

Belfield, C., & Bailey, T. (2017b). *The labor market returns to sub-baccalaureate college: A review*. A CAPSEE Working Paper. Center for Analysis of Postsecondary Education and Employment. Retrieved from https://ccrc.tc.columbia.edu/media/k2/attachments/labor-market-returns-sub-baccalaureate-college-review.pdf

Bohn, S., Jackson, J., & McConville, S. (2019a). *Career pathways and economic mobility at California's community colleges*. Public Policy Institute of California. Retrieved from https://eric.ed.gov/?id=ED598079

Bohn, S., Jackson, J., & McConville, S. (2019b). *Career pathways and economic mobility at California's community colleges: Technical appendices*. Public Policy Institute of California. Retrieved from https://www.ppic.org/wp-content/uploads/0619sbr-appendix.pdf

Bosworth, B. (2010). *Certificates count: An analysis of sub-baccalaureate certificates*. Complete College America. Retrieved from https://files.eric.ed.gov/fulltext/ED536837.pdf

Brock, T. (2021). Introduction. In T. Brock & D. Slater (Eds.), *Strategies for improving postsecondary credential attainment among Black, Hispanic, and Native American adults* (pp. 1-4). Community College Research Center, Columbia University.

Brown, J., & Kurzweil, M. (2017). *The complex universe of alternative postsecondary credentials and pathways*. American Academy of Arts and Sciences. Retrieved from http://www.amacad.org/sites/default/files/academy/multimedia/pdfs/publications/researchpapersmonographs/CFUE_Alternative-Pathways/CFUE_Alternative-Pathways.pdf

Carnevale, A. P., Garcia, T. L., Ridley, N., & Quinn, M. C. (2020). *The overlooked value of certificates and associate's degrees: What students need to know before they go to college*. Georgetown University Center on Education and the Workforce. Retrieved from https://vtechworks.lib.vt.edu/bitstream/handle/10919/99010/CertificatesAssociateDegrees.pdf?sequence=1

Carnevale, A. P., Rose, S. J., & Hanson, A. R. (2012). *Certificates: Gateway to gainful employment and college degrees*. Georgetown University Center on Education and the Workforce. Retrieved from https://repository.library.georgetown.edu/bitstream/handle/10822/559297/Certificates.FullReport.061812.pdf?sequence=1

Carruth, B., & Palica, M. (2018, November). *Career and technical education 2018 annual report* (Issue Brief No. 2018-6). Utah System of Higher Education.

Carruth, B., & Palica, M. (2020, January). *Career and technical education annual report* (Issue Brief No. 2020-2). Utah System of Higher Education.

Collins, M. L., & Hoffman, N. (2021). Challenging choices: Are short-term noncredit credentials a strategy for economic mobility for Black learners? *Change: The Magazine of Higher Learning, 53*(1), 34-38. https://doi.org/10.1080/00091383.2021.1850125

Community College Research Partners. (2008, February). *Ohio stackable certificates: Models for success*. Retrieved from http://www.workingpoorfamilies.org/pdfs/Ohio_Stackable.pdf

Council for Higher Education Accreditations (CHEA). (2019, October). *Conversations about quality in higher education: What are they are where do we take them?* Retrieved from https://files.eric.ed.gov/fulltext/ED603174.pdf

Course Report. (2020). *Coding bootcamps in 2020: Your complete guide to the world of bootcamps*. Retrieved from https://www.coursereport.com/coding-bootcamp-ultimate-guide

Credential Engine. (2021). *Counting U.S. postsecondary and secondary credentials*. Credential Engine.

Dadgar, M., & Trimble, M. J. (2015). Labor market returns to sub-baccalaureate credentials: How much does a community college degree or certificate pay? *Educational Evaluation and Policy Analysis, 37*(4), 399-418.

Daugherty, L., Kramer, J. W., Anderson, D. M., & Bozick, R. (2020). *Stacking educational credentials in Ohio: Pathways through postsecondary education in health care, manufacturing and engineering technology, and information technology*. RAND.

Flynn, W. J. (2002). *More than a matter of degree--Credentialing, certification and community colleges*. National Council for Continuing Education and Training. Retrieved from https://files.eric.ed.gov/fulltext/ED467853.pdf

Ganzglass, E. (2014, March). *Scaling "stackable credentials": Implications for implementation and policy*. Center for Postsecondary and Economic Success. Retrieved from https://files.eric.ed.gov/fulltext/ED561777.pdf

Garcia, R. (2018, January). *Connecting low-income students to good jobs and careers*. CLASP. Retrieved from https://files.eric.ed.gov/fulltext/ED586341.pdf

Giani, M., & Fox, H. L. (2017). Do stackable credentials reinforce stratification or promote upward mobility? An analysis of health professions pathways reform in a community college consortium. *Journal of Vocational Education & Training, 69*(1), 100-122.

Grubb, W. N. (1997). The returns to education in the sub-baccalaureate labor market, 1984–1990. *Economics of Education Review, 16*(3), 231-245.

Harris, B. W. (2015). *Economic and workforce development program annual report*. Retrieved from https://files.eric.ed.gov/fulltext/ED556754.pdf

Hasan, N., & Collins, D. (2020). *Creating stackable credential programs: The development of Colorado's banking and financial services stackable credential pathway program*. Retrieved from https://www.luminafoundation.org/resource/creating-stackable-credential-programs/

Holland, M. M., & DeLuca, S. (2016). "Why wait years to become something?" Low-income African American youth and the costly career search in for-profit trade schools. *Sociology of Education, 89*(4), 261-278. https://doi.org/10.1177%2F0038040716666607

Irwin, V., Zhang, J., Wang, X., Hein, S., Wang, K., Roberts, A., York, C., Barmer, A., Bullock Mann, F., Dilig, R., & Parker, S. (2021). *Report on the condition of education 2021* (NCES 2021-144). U.S. Department of Education. National Center for Education Statistics. Retrieved from https://nces.ed.gov/pubsearch/pubsinfoasp?pubid=2021144

Jepsen, C., Troske, K., & Coomes, P. (2014). The labor-market returns to community college degrees, diplomas, and certificates. *Journal of Labor Economics, 32*(1), 95-121. Retrieved from https://www.journals.uchicago.edu/doi/pdf/10.1086/671809

Kazis, R., & Leasor, L. A. (2021). Study 1. Aligning short-term credentials with community college degree programs. In T. Brock & D. Slater (Eds.), *Strategies for improving postsecondary credential attainment among Black, Hispanic, and Native American adults* (pp. 5-15). Community College Research Center, Columbia University.

Kentucky Council on Postsecondary Education. (2019). *Kentucky's degree and credential production 2013-2018*. Retrieved from http://cpe.ky.gov/data/reports/2019degreesreport.pdf

Klein-Collins, R., & Travers, N. (2020). *Learning recognition and the future of higher education – A vision for a post-pandemic learning ecosystem*. Retrieved from https://www.wiche.edu/key-initiatives/recognition-of-learning/pla-future/

Kurzweil, M. (2018). Alternative postsecondary pathways: What we know, what we don't know, and why it matters. *Change: The Magazine of Higher Learning, 50*(3-4), 154-157. https://www.tandfonline.com/action/showCitFormats?doi=10.1080/00091383.2018.1509654

Lin, Y., Fay, M. P., & Fink, J. (2020). *Stratified trajectories: Charting equity gaps in program pathways among community college students* (CCRC Working Paper No. 126). Community College Research Center, Teachers College, Columbia University. Retrieved from https://files.eric.ed.gov/fulltext/ED610667.pdf

Liu, V. Y. T. (2020). Is school out for the summer? The impact of year-round Pell Grants on academic and employment outcomes of community college students. *Education Finance and Policy, 15*(2), 241-269.

Lumina Foundation. (2013, February). *Strategic plan: 2013 to 2016*. Retrieved from https://www.luminafoundation.org/files/file/2013-lumina-strategic-plan.pdf

Lumina Foundation. (2020, November). *Accelerating quality credential pathways*. Retrieved from https://www.luminafoundation.org/wp-content/uploads/2020/11/accelerating-quality-credential-pathways-2020-11-11.pdf

McKinney, L., Burridge, A., & Mukherjee, M. (2017). Occupational certificates: Examining student characteristics and enrollment outcomes across the public and for-profit sectors. *Teachers College Record, 119*(11), 1-34.

Minaya, V., & Scott-Clayton, J. (2017). *Labor market trajectories for community college graduates: New evidence spanning the Great Recession*. A CAPSEE Working Paper. Center for Analysis of Postsecondary Education and Employment. Retrieved from https://files.eric.ed.gov/fulltext/ED573962.pdf

Museus, S. D. (2014). The culturally engaging campus environments (CECE) model: A new theory of success among racially diverse college student populations. In H*igher education: Handbook of theory and research* (pp. 189-227). Springer, Dordrecht.

National Conference of State Legislatures. (2018, December). *Innovation in higher education case study: Virginia's FastForward credentialing program*. Retrieved from https://www.ncsl.org/Portals/1/Documents/educ/Virginia_FastForward_f01.pdf

N.J. Stat. § 18A:54-43. Section 18A:54-43 – Work and Learn Consortium. (2020). Retrieved from https://casetext.com/statute/new-jersey-statutes/title-18a-education/chapter-18a54/section-18a54-43-work-and-learn-consortium

Non-degree Credentials Research Network (NCRN). (2019). *What we know about non-degree credentials: A literature scan*. Retrieved from https://gwipp.gwu.edu/sites/g/files/zaxdzs2181/f/downloads/06.23.19%20NCRN%20Literature%20Scan.pdf

Ohio Department of Higher Education. (2021, July). *The Ohio articulation and transfer policy*. Retrieved from https://www.ohiohighered.org/sites/default/files/uploads/transfer/policy/OATN%20Policy%20Update%20%28as%20of%207.7.21%29_1.pdf

Ositelu, M. O. (2021, March). *Five things policymakers should know about short-term credentials*. New America. Retrieved from https://www.newamerica.org/education-policy/reports/five-things-policymakers-should-know-about-short-term-credentials/

Ostroff Associates. (2021, July 28). *Governor Cuomo launches second round of $175 Million workforce development initiative*. Retrieved from https://www.ostroffassociates.com/news/governor-cuomo-launches-second-round-of-175-million-workforce-development-initiative/

Perea, B. (2020). Using Smaller Credentials to Build Flexible Degree Completion and Career Pathways. *New Directions for Community Colleges, 189*, 23-37.

SUNY Micro-Credentialing Task Force. (2018). *SUNY Micro-Credentialing Task Force report and recommendations*. Retrieved from https://system.suny.edu/media/suny/content-assets/documents/academic-affairs/Micro-Credentialing-TaskForce--Report.pdf

State of Michigan. (2021a). *Futures for Frontliners*. Retrieved from https://www.michigan.gov/frontliners/

State of Michigan. (2021b). *Michigan Reconnect*. Retrieved from https://www.michigan.gov/reconnect/

SUNY Dutchess Community College. (2021). *Micro-credentials*. Retrieved October 5, 2021, from https://www.sunydutchess.edu/academics/microcredentials2/index.html

Taylor, M., Turk, J. M., Chessman, H., & Espinosa, L. (2020). *Race and ethnicity in higher education: 2020 supplement*. The American Council on Education.

Tennessee Reconnect. (2021). *Tennessee Reconnect*. Retrieved from https://tnreconnect.gov/

Thomas, J., Gonzalez, N., Wiegand, A., Paxton, N., & Hebbar, L. (2021). *The effects of expanding Pell Grant eligibility for short occupational training programs: Results from the experimental sites initiative* (NCEE 2021–001). U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. Retrieved from http://ies.ed.gov/ncee

UMS Micro-Credential Steering Committee. (2019, May). *Micro-credential development within the UMS: Report and recommendations*. Retrieved from https://www.maine.edu/board-of-trustees/wp-content/uploads/sites/12/2019/11/MtgMat-ASA-082619-rev0823191.pdf

U.S. Department of Education, National Center for Education Statistics. (2002-03 to 2019-20). Integrated Postsecondary Education Data System (IPEDS), Completions component. Retrieved October 3, 2021 from https://nces.ed.gov/ipeds/TrendGenerator

U.S. Department of Education, National Center for Education Statistics. (2012-17). *Beginning Postsecondary Students: 2012/2017 (BPS)*. Retrieved October 1, 2021, from PowerStats https://nces.ed.gov/datalab/

U.S. Department of Labor. (2010). *Attachment 2. Credential resource guide*. Retrieved from https://wdr.doleta.gov/directives/attach/TEGL15-10a2.pdf

Utah System of Higher Education. (2017, April 11). *USHE initiative helps students earn meaningful credentials on their way to a degree*. Retrieved from https://ushe.edu/stackable-credentials-help-students-earn-credentials-on-their-way-to-a-degree/

Virginia's Community Colleges. (2021). *FastForward*. Retrieved October 1, 2021 from https://www.fastforwardva.org/

Xu, D., & Trimble, M. (2016). What about certificates? Evidence on the labor market returns to nondegree community college awards in two states. *Educational Evaluation and Policy Analysis, 38*(2), 272-292.

Washington State Board for Community and Technical Colleges. (2017, January). *Certificate structure study: Do stackable certificates really "add" up to a degree?* Retrieved from https://files.eric.ed.gov/fulltext/ED573032.pdf

Washington Workforce Training and Education Coordinating Board. (2021). *Washington Career Bridge*. Retrieved from https://www.careerbridge.wa.gov/

White House Briefing Room. (2021, July 22). *Fact sheet: How the Build Back Better Plan will create a better future for young Americans*. Retrieved from https://www.whitehouse.gov/briefing-room/statements-releases/2021/07/22/fact-sheet-how-the-build-back-better-plan-will-create-a-better-future-for-young-americans/

APPENDIX A. SUPPLEMENTAL LITERATURE SUMMARY FOR STUDIES ABOUT CERTIFICATE STUDENTS' LABOR MARKET OUTCOMES

Table A1. Literature Summary Matrix for Studies about Certificate Students' Labor Market Outcomes

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
Bahr et al. (2015)	First-time college students entering five community colleges in Michigan 20,581 students between 17 and 60 years old at first enrollment, with complete data on gender, and with earnings before and after enrolling in college through quarter two of 2021	Five community colleges in Michigan	Short-term certificates (<15 credits) Long-term certificates Associate degrees	Series of regression models	Bahr et al. examined labor market returns through 2011 for community college students enrolled in Michigan community colleges in 2003 and 2004. Women did not experience returns to short-term certificates (defined as fewer than 15 credits) compared to students with no college-level credential, while men's annual earnings increased by $5,200, on average, after completing a short-term certificate.
Bahr (2016)	First-time college students entering the California Community College system (CCC) between fall 2002 and summer 2008 1,115,386 students (representing 59% of all first-time	California Community College (CCC) system	Low-credit awards (<6 credits) Short-term certificates (6-29 credits Long-term certificates (30-59 credits)	Fixed effects linear regression	In addition to examining the immediate economic returns to low-credit awards, short-term certificates, long-term certificates, and associate degrees, Bahr also examined their durability over time. Students across all credential types received an economic benefit. The average returns for low-credit awards, short-term certificates, long-term certificates, and associate degrees were $850.97, $778.16, $1,003.56, and $416.56, respectively. While economic returns to associate degrees remained

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
	students) with a valid social security number and one or more non-zero quarterly earnings records in the 10 quarters prior to entering CCC and one non-zero record while enrolled in CCC or after through December 2013		Associate degree (60+ credits)		strong over time, the economic payoff of certificates and low-credit awards declined over time or flattened. There were notable differences in economic returns based on gender. Across all racial/ethnic groups, men had stronger economic returns for short-term certificates; for example, the average change in quarterly earnings was $187.88 for White men and $19.20 for White women. Moreover, only White men, White women, and Hispanic women experienced significant returns to low-credit awards. Bahr found substantial differences in economic returns across fields of study. The highest rate of change in quarterly earnings for short-term certificates and low-credit awards was in the field of public and protective services ($331.06). Biological sciences had the second highest rate of return among short-term certificates ($219.31). Importantly, some short-term credential fields had *negative* returns, including education (-$167.33), fine and applied arts (-$124.71), and interdisciplinary studies (-$122.20).
Bailey & Belfield (2017b)	NLSY97 sample of 9,000 children who were 12 to 16 years old by the end of 1996	Various	Certificate program (at least one year and completed as	The authors examined the NLSY97, SIPP 2008, and ELS 2002 data	Bailey and Belfield found weak returns to stackable credentials, such that there appeared to be no additional labor market value earned from one credential relative to multiple stacked credentials. Bailey and Belfield caution that

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
	40,695 respondents to the 2008 Survey of Income and Program Participation (SIPP) Education Longitudinal Study of 2002 (ELS) which includes 16,700 students enrolled in 10th grade in 2002		postsecondary institution) Associate degrees Bachelor's degrees Vocational award (other awards) Credential stacks	using regression models for this study and reviewed data from other related studies.	simply earning multiple awards on top of one another should not count as stacking credentials, unless each credential adds to the earnings power of the ones that precede it. Also, the earnings power of the full suite of credentials should have additional earnings power above and beyond the independent effects of each one. In essence, there should be an extra booster effect upon receiving all credentials in a stack. Moreover, because students might temporarily leave the labor market to earn a credential or reduce their hours, the credential should offset these opportunity costs.
Belfield & Bailey (2017a, 2017b) *Main and brief*	State data systems combining educational attainment and earnings data	Arkansas, California, Kentucky, Michigan, North Carolina, Ohio, Virginia, Washington	Certificates Associate degrees	Regression models	Belfield and Bailey summarized findings across a series of reports conducted by CAPSEE. The average quarterly returns on certificates were $530 for males and $740 for females, but these returns are not consistent across states and some studies even pointed to negative returns on certificates. Additionally, even when students do not complete a credential, there is some evidence of a positive linear association between credits earned and earnings. Quarterly earnings also varied across disciplines, with health-related certificates having considerably higher earnings. Findings across the studies also indicated that students are completing excess credits. Associate degree recipients had an average of

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
					10 extra credits, and students who dropped out of college typically had about 20 credits. Belfield and Bailey also discussed the difficulty of accurately computing labor market returns, because a large proportion of students continue to work while in college.
Bohn et al. (2019a, 2019b) *Main and technical report*	The earnings analysis was limited to nearly 195,000 students who completed a career credential between 2003 and 2010.	California Community College (CCC) system	Short-term certificates (6-29 credits) Long-term certificates (30-59 credits) Associate degrees (60+ credits)	Series of regression analyses	Bohn et al. used administrative data linking students' enrollment in career education programs, program completion, and earnings data among students enrolled in California's community colleges. Within one year of completing a vocational certificate or associate degree, students increased their earnings by 20%. However, there was variation in outcomes depending on the length of the credential. The average percentage wage increase for a short-term certificate (6 to 29 credits) was only 8% compared to 21% for a long-term certificate (30 to 59 credits) and 32% for an associate degree. Bohn et al. also found that stacked credentials are associated with increased earnings power, but it takes longer for these students to earn middle-income wages on par with students who completed a single associate degree. Bohn et al. found that Black and Latinx students tend to receive lower returns on their

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
					investments relative to White and Asian students. Some of these differences could be explained by differences in field of study. Moreover, Bohn et al. found that it took Black short-term credential earners six quarters to earn middle-income wages, compared to only three quarters for White students completing a short credential. Similarly, it took female students eight quarters to earn middle-income wages after earning a short-term credential whereas it took male students only one quarter. Bohn et al. noted the importance of considering regional labor market factors when considering the payoff of credentials. In California, Bohn et al. estimate that the Bay Area and San Jose regions will have fewer jobs requiring middle skills relative to the Sacramento area, Central Valley, and the Inland Empire.
Carnevale et al. (2012)	National Longitudinal Study of Youth (NLSY), 1997 cohort 2004 and 2008 panels of the Survey of Income and Program Participation (SIPP)	United States	Short-term certificates (less than one year) Medium-term certificates (one to two years) Long-term certificates	Descriptive statistics and regression	Adults who completed a certificate earned an average of 20% more than high school graduates without postsecondary education. Students who find employment in a field directly connected to their credential have higher earnings relative to those employed in another field. Certificate holders who work in the same field as their certificate earn 37% more than individuals who work outside the field. In contrast, certificate holders who work outside of

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
			require (two to four years)		their field of study experience minimal economic benefits, since they earn only 1% more on average than adults whose highest educational credential is a high school diploma. However, Carnevale et al. found that only 44% of certificate holders work in the field of their certificate, suggesting that there are barriers to entry for certificate holders. Carnevale et al. also examined certificates in 14 fields of study and found that 12 out of 14 fields were highly segregated by sex, meaning that 75% of certificate holders were men or 75% of certificate holders were women, depending on the field. Due to this stratification in certificate completion by gender, women tended to complete certificates that were associated with an earnings increase of 16% over a high school diploma, whereas men tended to complete certificates with an associated earnings increase of 27%, over 10 percentage points higher than women. In some fields, certificate holders can earn more than associate and bachelor's degree holders. For instance, men with a certificate in computer and information services earn an average of $72,498 annually, which is more on average than 72% of men with associate degrees and 54% of men with bachelor's degrees. Similarly, women with a computer and information services certificate earn an average of $56,664

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
					annually, which is more than 75% and 64% of all women with associate and bachelor's degrees, respectively. These findings for computer and information services certificate holders only apply when men and women are working in the field associated with their field of study. Only 24% of men and 7% of women with computer and information services certificates are working in computer and information services. Carnevale et al. (2012) also identified variation across states in terms of the labor market value of their certificates. For example, in South Carolina, only 41% of certificates have significant earnings returned, compared to 65% of certificates in North Dakota, Rhode Island, and Montana. The economic benefits of a certificate also depend on the school that awarded the credential due to the costs associated with completing the credential at a public institution compared to a for-profit institution (Carnevale et al., 2012).
Carnevale et al. (2020)	2016 Adult Training and Education Survey (ATES) 2010-2016 American Community Survey (ACS)	United States overall with additional state-specific analyses for Colorado, Connecticut, Indiana, Kentucky,	Certificate Associate degrees	Descriptive statistics	There is wide variation in the economic benefit of certificate programs by academic field of study. Certificates in engineering technology can lead to median earnings between $75,001 and $150,000. In sharp contrast, median earnings are between $10,001 and $20,000 for certificates in cosmetology and education.

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
	2013-14 to 2015-16 Integrated Postsecondary Education Data System (IPEDS) 2016 National Postsecondary Student Aid Study (NPSAS) 2007-2016 (depending on the state) State administrative data	Minnesota, Ohio, Oregon, Texas, Virginia, and Washington			Working in a field that is closely related to their academic field of study is associated with higher median earnings. Certificates in blue collar fields can have high median earnings. For example, certificates in industrial equipment maintenance yield a median earnings of $61,000 in Minnesota, while a tool and die technician is expected to earn $56,000 in Washington. Black and Latinx students are overrepresented among certificate earners.
Carruth & Palica (2018)	Students who completed a CTE certificate or associate degree in 2013 and did not subsequently earn a higher credential	Utah System of Higher Education (USHE)	CTE certificates of less than years Associate degrees	Descriptive statistics	The Utah System of Higher Education (USHE) works closely with local business leaders to create short-term certificate (16 to 29 credits) career and technical education programs that are closely aligned with workforce needs. In addition to improving students' earnings and employment prospects, one of the system's goals has been identifying pathways to stack certificates with other certificates or degree programs. USHE has three types of career and technical education credentials: the certificate of proficiency which takes less than one year to complete; the certificate of completion which is about one year in length and includes general

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
					education; and the associate of applied science degree. Among those completing a CTE certificate in 2013, the median fifth-year annual earnings for a less than two-year CTE certificate is $35,337.
Carruth & Palica (2020)	Students who completed a CTE certificate or associate degree in 2013 and did not subsequently earn a higher credential	Utah System of Higher Education (USHE)	CTE certificates of less than years Associate degrees	Descriptive statistics	Among those completing a CTE certificate in 2014, the median fifth-year annual earnings for a less than two-year CTE certificate is $37,814. See Carruth and Palica (2018) for additional details on the Utah System of Higher Education.
Dadgar & Trimble (2015)	24,221 first-time students in the 2001-02 cohort with wage data before and after enrollment	Washington State Board of Community and Technical Colleges (SBCTC).	Short-term certificate (less than one year of full-time study) Long-term certificates (at least one year of full-time study)	Individual fixed effects regression model	Dadgar and Trimble analyzed data for students entering Washington State community colleges during the 2001-2002 academic year. With very few exceptions (e.g., protective services for men), short-term certificates did not lead to improved earnings, even in allied health care and nursing which had high returns for long-term certificates. Moreover, Dadgar and Trimble also found that earning a short-term certificate did not improve one's likelihood of employment or the total number of hours worked.
Giani & Fox (2017)	4,888 students enrolled in a health professions program	Health Professions Pathways (H2P) Consortium, comprised of	Very short-term certificates (12 credits or less, including noncredit)	Regression models	Students who completed short-term certificates had twice the growth in their quarterly income relative to students not earning a credential ($3,042 vs. $1,524 quarterly earnings growth). Those students earning short-term certificates

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
		nine community colleges in five states	Short-term certificates (more than 12 credits but less than one year of study) Longer certificate programs lasting more than one year but less than two years Associate degrees (two-years of study)		did not have higher odds of being employed relative to those without a credential. Even though Giani and Fox found economic benefits for short-term certificates requiring more than 12 credits, students who earned a very short certificate (12 credits or less) had lower growth in their quarterly income relative to students earning no credential ($1,489 vs. $1,524 quarterly earnings growth). Students earning very short-term certificates (12 credits or less) had higher odds of being employed relative to those earning no credential, but the same was not true for short-term certificates (more than 12 credits but less than one year). However, Giani and Fox partially attributed the lack of significance for short-term credentials to the low sample size for that group.
Grubb (1997)	1984, 1987, and 1990 data from the Survey of Income and Program Participation	United States	Certificates Associate degrees Bachelor's degrees	Regression models	Students who completed a certificate had significantly higher earnings. Students who complete coursework but do not earn a credential do not benefit economically from the coursework they completed. Grubb also found high variation across fields of study. Health and business had a positive effect on earnings for women, while engineering, technical fields, and business having a large benefit for men.

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
					Students who find employment in a field directly connected to their credential have higher earnings relative to those employed in another field.
Jepsen et al. (2014)	25,453 students, age 20-60, in the 2002-03 and 2003-04 cohorts	Kentucky Community and Technical College System (KCTCS)	Certificates (between 12 and 36 credits) Diplomas (between 36 and 68 credits) Associate degrees (60-78 credits)	Fixed-effect regression modeling	The quarterly earnings return for a certificate was $300 for both men and women. In comparison, the quarterly returns for a diploma are $1,914 for women and $1,265 for men.
Lin et al. (2020)	573,806 first-time, credential-seeking students entering one of 20 community colleges between 2009-2018	One anonymous U.S. state	Workforce-oriented credentials	Regression models	Black students are more likely than White students to stop out of community college for more than four terms, less likely to transfer to a four-year institution, and less likely to obtain a bachelor's degree. Moreover, Black and Hispanic students were less likely than White students to earn a credential that leads to middle-income or high-income jobs. Women of each racial/ethnic group were more likely than men of the same racial/ethnic group to transfer to a four-year college and complete a credential. Black and White students from lower-income backgrounds were less likely to transfer and earn a credential relative to more economically well-off students of the same race.

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
					Contrary to some of the espoused beliefs that completing a certificate will increase students' likelihood of earning a more advanced credential, Lin et al. found that community college students who completed a certificate were *less likely* to transfer or earn a bachelor's degree.
McKinney et al. (2017)	Beginning Postsecondary Student Study (BPS:04/09) data containing 1,770 students enrolled in a career-oriented sub-baccalaureate certificate	United States	Career-oriented sub-baccalaureate certificate	Binary and multinomial logistic regression modeling	Six years after students first enrolled in a certificate program, those starting at a for-profit institution had the lowest rate of completing the credential, were more likely to have loans, and were more likely to have defaulted on those loans than students attending public institutions. During the 2003-2004 academic year, for-profit certificate students had much higher rates of borrowing federal loans (85%) compared to the certificate students at community colleges (28%) and career and technical centers (24%). Interestingly, the attainment and dropout rates for students attending community colleges (attainment: 57%, dropout: 33%) and for-profit (attainment: 55%, dropout: 36%) institutions were similar. In comparison, the attainment rate was highest (68%) for students beginning the certificate at a public career and technical center and the dropout rate was the lowest (27%). The average net cost, after financial aid, was much higher at for-profit institutions ($5,385), compared to career and technical centers

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
					($1,132) and community colleges ($685). Among those who borrowed, the average loan amount in 2003-2004 was $4,010 for for-profit students; $4,612 for career and technical center students; and $2,479 for community college certificate students. By 2009, 21% of for-profit school certificate students defaulted on their loans compared to 6% of community college certificate students and 1% of career and technical center students.
Minaya & Scott-Clayton (2017)	95,690 Ohio first-time students enrolled in a community or technical college between fall 2001 and fall 2004 and excluding students transferring to a four-year college	Ohio *(comparisons with Kentucky)*	Short-term certificate (less than one year) Long-term certificate (at least one year but less than two-year) Associate degree	Regression modeling in Ohio with additional comparisons with Kentucky using data from Jepsen et al. (2014)	Minaya and Scott-Clayton examined estimated returns for short-term certificate earners in Ohio and Kentucky. Women who completed a short certificate had an estimated return of $174 in Ohio and $300 in Kentucky, while men had a negative $358 return for a short certificate in Ohio and a positive $300 in Kentucky.
Ositelu (2021)	1,393 adult participants respondents to the Adult Training and Education Survey (ATES), with a high school diploma but no credential at the	United States and focus groups in Georgia and Virginia	Short-term certificates lasting 15 weeks or fewer	Descriptive statistics Focus groups	Just over half (51%) of those earning a short-term certificate of less than 15 weeks or fewer earn less than $30,000. Black and Latinx adults with a short-term certificate earn lower median incomes than White adults. Women earn lower median incomes than men. Adults who earn health care short-term certificates have the lowest annual earnings.

Author(s)	Sample	Context	Type of Program Examined	Methodology	Key Findings
	associate level or higher Focus groups with 48 adults completing short-term certificate programs of 15 weeks or less				Women and racial/ethnic minorities are disproportionately enrolled in health care short-term certificates. 71% of adults reported that their short-term certificate was "somewhat" or "very" useful for employment. 81% of adults reported that their short-term certificate was useful for skill improvement. 54% of adults reported that their short-term certificate was useful for economic mobility. Black adults with a short-term certificate were more likely to be *unemployed* relative to White adults (45% vs. 41%).
Xu & Trimble (2016)	North Carolina: first-time students in the 2006-07 and 2007-08 cohorts with earnings data Virginia: first-time students in the 2006-07, 2007-08, and 2008-09 cohorts with earnings data	Virginia Community College System (VCCS) and North Carolina Community College System (NCCCS)	Short-term certificates (less than one year of full-time study) Long-term certificates (a year or more of full-time study)	Individual fixed-effects regression model	Completing a short-term certificate (less than one year of study) was associated with a modest quarterly earnings increase of $278 and $153 in North Carolina and Virginia, respectively. Additionally, there was a six percentage and three percentage point increase in likelihood of employment in North Carolina and Virginia, respectively, after completing a short-term certificate. However, when conditioned on employment, there was no benefit to completing a short-term certificate in North Carolina.