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A World of Transformation: Moving from Degrees to Skills-Based Alternative Credentials

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Abstract

Postsecondary education is undergoing a period of profound change. One of the most significant changes is the emergence of skills-based alternative credentials as both complements and alternatives to traditional degrees. Several factors have combined to favor these shorter, less expensive, and more versatile ways to gain knowledge and skills for work. They are the rigidity and high cost of traditional degrees; the fact that traditional institutions are failing to equip many graduates with the skills they need; and the need to rapidly upskill and reskill workers to meet the increasingly complex demands of modern economies. This report summarizes evidence suggesting a decrease in the value of degrees as a signaling mechanism in the labor market. It also identifies the benefits of non-degree alternative credentials and makes recommendations on ways to increase their value and acceptance in the market. It remains to be seen whether whether alternative credentials are a short-term strategy to close the skills gaps and deal with the transition to adaptive and qualified labor, or a permanent strategy of human capital development.

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Executive Summary

Traditional degrees take years and often thousands of dollars to acquire—and they frequently fail to prepare students for the workplace. They are costly for individuals, their families, companies, and society, in terms of both direct outlays and opportunity costs. Recognizing the high cost of a post-secondary degree, both students and employers are looking for more responsive, shorter, less expensive, non-degree alternative credentials (Non-Degree Credentials Research Network, 2019).

Do such alternative credentials serve the needs of individuals, employers, and society as a whole? This report examines the evidence and makes recommendations on ways to increase their value and acceptance in the market.

What are alternative credentials?

Academic degrees are credentials awarded by a college, university, or other postsecondary educational institution upon completion of a prescribed course of study or in recognition of a scholarly work deemed worthy of the degree (Klasik, 2012).

Alternative non-degree credentials constitute a wide array of credentials not recognized as "standalone formal educational qualifications by relevant national education authorities" (Kato, Galan-Muros, and Weko, 2020). They are awarded upon completion of one or more academic courses or a program of training, or evaluation. The principal types of alternative credentials are reviewed in box ES.1.

Box ES.1 Main features of three broad types of alternative credentials

Alternative or non-degree credentials can be broken down into three broad categories:

Certificates of course completion

include certificates issued by so-called massive open online courses (MOOCs) (1–10+ hours), micro-credentials (100 hours to a year), and certificates of completion of continuing education programs (100 hours to 4 years). All are shorter in duration than an academic degree, though some may give rise to academic credit and be "stackable" with other courses. Costs vary widely from a few hundred dollars to $20,000.

Certificates of training completion

are issued to those who complete occupation-focused training such as a coding or programming bootcamp (6 weeks to 3 years) or an apprenticeship (6 weeks to 6 years). The bootcamp costs vary from free to $85,000. They blend work experience with instruction and generally involve no monetary cost to the apprentice.

Certification of skills after passing an assessment

indicate that individuals have adequate knowledge and can competently perform certain tasks. Industry-recognized certifications are awarded by industry and professional associations based on formal assessments, which can cost up to a few $1,400 dollars. Some certifications are time limited—that is, they must be periodically renewed.

What is driving the demand for alternative credentials?

Alternative credentials have been driven by both demand for qualified labor and an emerging supply of programs providing such credentials. Many companies—including Apple, Google, IBM, Bank of America, and EY—no longer require degrees for new hires. Some of them, such as Google, IBM, and Amazon, both hire people with such credentials and offer professional certificates and education curricula, often in partnership with higher education institutions (Swift et al., 2020; Uranis et al., 2022).

Workers lack the skills employers need. Despite spending more than ever on hiring (Bersin, 2014), employers have been struggling to identify workers with the skills they need (PwC, 2020). Many jobs require higher levels of skills than were required in the past (Hwang and Kim, 2020), which current education and formal training systems are not providing (World Economic Forum, 2017, 2020; IDB et al., 2022; King and Zaharchuk, 2016). Skills mismatches and shortages reveal the need to upskill and reskill workers more quickly and develop better-qualified labor.

This need is particularly great given the rapid pace at which jobs and occupations now change. A 2016 study projected that about 65% of children entering primary schools would hold jobs that did not yet exist (World Economic Forum, 2016). Skills get outdated more rapidly than ever (Pelster, Stempel, and van der Vyver, 2017; World Economic

Forum, 2016). Companies estimate that 40% of their workers will need reskilling for six months or less (World Economic Forum, 2020).

Traditional degree programs are costly and often fail to serve employers' needs. Traditional academic degrees are expensive to obtain. In the United States, for example, student loan borrowers collectively owe more than $1.5 trillion (an average of $34,000 per borrower), making student loans the second-largest type of consumer debt (Mitchell, 2019). In Latin America, annual tuition ranges from US$1,243 for universities and US$2,694 for four-year professional institutes in Peru to US$5,423 for five-year universities in Chile (Espinoza and Urzúa, 2016). Some countries in Latin America and Europe offer free tuition to students. In these cases, it is taxpayers who finance tuition (Ferreyra et al., 2017). Formal education and training systems are also rigid, with many failing to teach their students the skills they need to succeed in the workplace.

New types of education programs have emerged. In response to both demand and supply, the education and labor markets have experienced a paradigm shift, progressively accepting unconventional, practical, diversified, unbundled education and training programs offered by the private sector. Degrees can be viewed as bundles of sequenced curricula, with clearly defined credit hours, classes, and courses. Micro-credentials and alternative credential courses provide unbundled, focused, targeted courses as alternatives to or substitutes for degrees (HolonIQ, 2021). More and more providers have been unbundling education, developing modular models, and, by doing so, making education more affordable, accessible, and convenient (Christensen et al., 2011; Horn, 2014)

Similarities between degrees and alternative credentials

Both degree and alternative credentials do the following:

Increase human capital. Schooling and training provide marketable skills and abilities relevant to job performance (Becker, 1964; Schultz, 1962).

Communicate specific technical abilities and productivity. Job candidates and employers use education credentials to communicate and signal specific technical abilities and productivity (Bills, 2003; Non-Degree Credentials Research Network, 2019).

Screen and filter job candidates. Education and training serve as screening and filtering devices, conveying information to employers or labor purchasers (Arrow, 1973; Bills, 2003).

Provide signals to employers and branding for job seekers. Some experts argue that degrees and credentials matter much more than the skills and knowledge people acquire from classes. Education credentials send signals to potential employees about the applicant's skills and capabilities (Spence, 1973). The effect of education on earnings is not linear, as degrees and some Non-Degree credentials provide a much large boost to earnings than a single year of schooling (the "sheepskin effect") (Belman & Heywood, 1991; Busso et al., 2020).

Communicate cultural, social, and interpersonal characteristics. Individuals learn skills, norms, and protocols in schools, but they also self-select education levels and options.

Differences between degrees and alternative credentials

These two major classes of credentials, degrees and alternative credentials, differ in program length, the breadth of skills taught, the manner of validation, providers, cost, recognition and market value, networking opportunities, employers' perceptions, and level of industry involvement.

In many fields, alternative credentials can provide quicker, less expensive, more accessible, more versatile solutions than academic degrees, providing an attractive alternative path to good employment. In some cases, the variance within the category is greater than that between categories.

Program length. Undergraduate university degrees require at least two years to six years; some alternative credentials can be obtained in a matter of hours. Alternative credentials are typically much more focused than university degrees.

Ways of validation. Attendance, assignments, examinations, grades, and credit hours all count toward a university degree; for alternative credentials, examinations predominate in the validation of certification of skills, whereas attendance and assignments prevail for certificates of course or training completion.

Providers. The providers of academic credentials are higher education institutions, accredited and unaccredited, whereas professional and industrial organizations play a much larger role in alternative credentials.

Costs. Alternative credentials can cost a fraction of traditional bachelor's degrees. Traditional bachelor's degrees can cost more than $40,000 to $150,000 in the U.S., and up to about US$ 5,500 in Latin America, although those earning degrees can take advantage of a wider range of financial assistance (e.g., financial aid, grants, loans, tax credits, work-study). Conversely, alternative credentials are much less expensive. Specifically, certificates for completing courses cost $0 to $5,000. Certificates for occupation-focused training cost from zero to $50 per month to $13,500. Certifications costs $100 to $1,400, depending on the assessment.

Market value and recognition. The economic value of an academic degree varies widely with the major subject; similarly, the value of alternative credentials varies substantially across occupations, subjects, types, industries, states, and regions. Some alternative credentials, such as coding bootcamps certificates, can have similar earning potentials compared to bachelor's degrees. Among alternative credentials, employers ask for professional certifications much more often than academic certificates.

Social capital and networking opportunities. Degree programs offer extracurricular activities, opportunities to forge friendships and connections, and access to social networks, including alumni; alternative credentials offer fewer social networking possibilities.

Employers' perception and premium. Although academic degrees serve as a long-established proxy for employers, employers often place heavy emphasis on specialized certificates and certifications when hiring. Most academic credentials have no explicit tie to a specific field, profession, or industry, whereas many alternative credentials are closely tied.

Some large companies offer their own credentials, either directly or in conjunction with academic institutions (Gallagher, 2016). AT&T sponsors Georgia Tech's online master's program in computer science, for example; Google offers professional certificates (Google, 2022), Amazon Web Service offers certifications (AWS, 2022), and IBM offers badges (IBM, 2022). Some professional certifications—for auto repair (ASE certifications), IT help desk (CompTIA), and welding (American Welding Society [AWS] and American Society of Mechanical Engineers [ASME) certifications), for example—are already recognized in the market (Markow et al., 2017).

What occupations are open to alternative credentials?

Information and communication technology. People with the needed skills who lack degrees can earn high salaries in new and emerging jobs in information and communication technology (ICT). Computer programmers, developers, security analysts, and computer support specialists do not need to hold academic degrees; ICT professionals can hold various types of alternative credentials, including course certificates, coding bootcamp certificates, and certifications. Notably, these occupations offer competitive pay to alternative, non-degree credential holders, compared to other occupations requiring degrees.

Engineering. Many occupations in engineering still require bachelor's or master's degrees. Technicians and drafters often hold two-year degrees, certificates, or certifications; some gain their credential through apprenticeship.

Construction, installation, repair, and transportation. Many jobs in construction, installation, repair, and transportation require apprenticeships. They include carpenters, construction laborers, electrical power-line installers and repairers, electricians, truck drivers, plumbers, and sheet metal workers (Torpey, 2019).

Conversely, lawyers, doctors, pharmacists, and other professionals must still obtain academic degrees.

When can alternative credentials be particularly helpful?

Alternative credentials reflect the need for skills that are in high demand but short supply, which is valuable information for employers and job seekers alike (Markow et al., 2017). In other words, they attest to the existence of a talent shortage. By earning a alternative credential, job seekers can gain major payoff.

In particular, alternative credentials conferred after relevant learning and training programs can boost the prospects of low-income workers and indigenous/marginalized populations (Ferreyra et al., 2021).

Next steps: What needs to be done to realize the full potential of alternative credentials?

New generations will not necessarily need higher education degrees to succeed in the labor market. In many fields, alternative credentials can provide quicker, less expensive, more accessible, more versatile solutions than academic degrees, providing an attractive alternative path to good employment (Ferreyra et al., 2021).

Alternative credentials can be stacked into various types of other credentials, including academic degrees, to help meet the demand for skills, especially in low-income, vulnerable populations (Bailey & Belfield, 2017). That "stackability" can encourage people to engage in lifelong learning.

Alternative credentials can also provide a shortcut to employment (Workcred, 2020). With so many students dropping out of school for lack of time or resources, alternative credentials can provide an attractive, short, and accessible alternative to gain skills (Ferreyra et al., 2021). To enable such students to realize their full potential, greater efforts are needed to promote alternative learning through stackable, alternative credentials.

Alternative credentials can also impart soft skills, which are critical for successful work and life. At present, however, only few alternative credentials focus specifically on soft skills.

Despite the benefits they offer to job-seekers, employers, and the economy, alternative credentials are not yet fulfilling their full potential. Increasing their acceptance will require continuous improvement in several areas, notably those discussed below.

Efforts should be made to collect data and raise awareness about the existence and benefits of alternative credentials among employers and prospective students. In the United States, higher education institutions are required to report data on completion rates, employment, and the wages of students who earn degrees; no equivalent policy exist for alternative credentials. Providing information about costs, funding options, salaries, and career options could help increase the attractiveness of alternative credentials.

Alternative credentials have stigma that they are the lesser choice compared to bachelor's programs (Ferreyra et al., 2021; Fazio et al., 2016). Public and private sector will need to work to remove the stigma and increase alternative credentials desirability by communicating potentials that alternative credentials can provide and success stories.

The quality of alternative credentials must be continuously improved. Alternative credentials have an uneven quality. Evidence indicates that industry-wide standardized criteria can be a key factor for the strong market value of professional certifications (Markow, 2017). No regulations presently govern the delivery, duration, assessment, validation, or content of alternative credentials. Quality assurance processes that provide oversight, supervision, and regulation of programs and institutions (Taylor & Soares, 2020) and industry-wide standardized criteria (Markow, 2017) may be needed.

To better align programs with employers' needs, they should include more experiential learning. Methods of assessment could be expanded to include, for example, performance-based assessment, work portfolios, and other means of demonstrating competence.

Blockchain could be used to create verifiable, portable, interoperable, user-controlled digital alternative credentials. Blockchain technology can store a person's entire learning journey, including content, outcomes, achievements, and academic certificates, while reducing credential fraud risks (Chen et al., 2018; Smolenski, 2021). This information can be transformed into digital currency and stored in a blockchain network (Chen et al., 2018).

The government must play a role. But the private sector, which is by far the largest employer, must alter its perceptions, hiring habits, and career development programs to increase opportunities for workers without college degrees (Lohr, 2020).

This is a wake-up call for traditional formal education and training systems to adapt to a world in transformation. Based on our experience of the 21st-Century Skills Coalition at the Inter-American Development Bank, our call for action implores the public and private sectors to learn from and collaborate with each other.

Only by strengthening the training and employment ecosystems with public-private partnerships can we bridge the massive skills gaps. Only if the Latin American and Caribbean region bridges the talent gap will its countries be able to prosper, innovate, and compete globally.

Part 1:

Hello, Disruption

Part 1:
Hello, Disruption

For several generations, academic degrees have been a currency graduates use in exchange for good jobs in the labor market. But this connection between formal credentials and jobs is being disrupted.

Despite the continuing value and wage premiums being awarded to degree holders, the benefits of college and university degrees are being questioned by students, employees, and employers (Belkin, 2020). About 40% of recent college graduates in the United States hold jobs that require no college degree (Federal Reserve Bank of New York, 2021).

Furthermore, more than 60% of college students in the United States graduate with student loan debt, and, student loan borrowers collectively owe over $1.5 trillion (on average, $34,000 per person) (Mitchell, 2019). Studies have found that 6% to 25% of university and college programs leave students financially worse off than if they never attended the program (Copper, 2021a, 2021b; Gillen, 2021; Itzkowitz, 2021; Marcus, 2021). This low return on investment is common among those majoring in art, music, philosophy, religion, and psychology (Copper, 2021a, 2021b; Marcus, 2021).

Over the past two decades in Latin America, the higher education system has expanded, with enrollment doubling, from 23% in 2000 to 54% in 2020 (World Bank, 2022). The region now has the third-largest student populations, following North America (86%) and Europe and Central Asia (70%). In Brazil, Chile, Colombia, and Venezuela, enrollment rose more than 30% over the past 15 years. Approximately 28 million students in Latin America are studying at 10,000 universities and college and taking part in 60,000 academic programs.

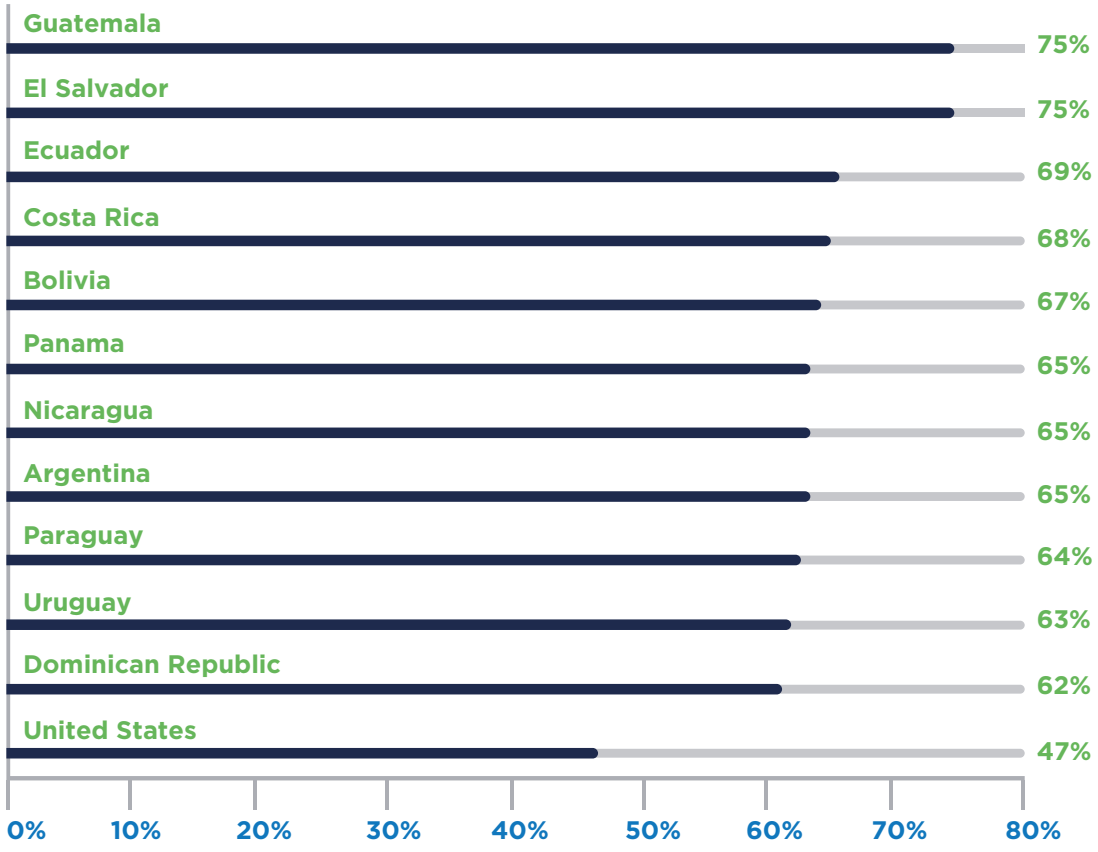
Despite these higher numbers, however, Latin America employers and businesses have not become more productive, nor have they found ways to employ the region's graduates, and achievement that would contribute to closing the so-called skills gaps. Completion of a course of tertiary study, culminating in a degree, has become more fraught, with a 46% graduation rate. Students between ages 25 and 29 years either dropped out of or delayed their studies (Ferreyra et al., 2017). Only Mexico and Peru showed completion rates similar to those in the United States. The study-completion numbers are even worse for low-income and indigenous or other marginalized population groups. Their access to tertiary-level educations is under 10%, compared with 70% for the wealthiest students. Also, disadvantaged ethnic groups are 15% less likely to attend college and university (Ferreyra et al., 2017). Reasons for these disparities in part rest in weak quality-assurance mechanisms for higher education and the education's misalignment with labor market needs.

The number of college student enrollments fell during the pandemic (National Student Clearinghouse, 2021a), as did the number of high school graduates going straight to university (National Student Clearinghouse, 2021b). These declines were caused, in part, by perceptions about the value of degree-granting programs in the midst of a pandemic. Some students turned to online education providers. Enrollment in short-term credential-providing classes rose to 8 million learners (a 70% rise); approximately 30,000 students graduated from coding bootcamps in 2019 (Belkin, 2020).

The current skills shortage, or mismatch, makes it more difficult for employers to find applicants (LaPrade et al., n.d.; ManpowerGroup, 2018). This challenge (not enough workers with the right mix of skills) is not new, but the COVID-19 pandemic accelerated the trend. There may also be a disconnect between what kind of employees companies need in the 21st century and what job skills the tertiary education system is imparting (World Economic Forum, 2017, 2020). In addition, a shift in the relative importance of skills is placing a premium on "soft skills" (Deming, 2017; Heckman & Kautz, 2012; Edin et al., 2017). Perseverance, sociability, and curiosity are some of the attributes seen in the most gifted job seekers, predicting success in life (Weidmann and Deming, 2020). People with high social skills work more efficiently by coordinating or trading tasks with others. Can these soft skills be imparted by credentialing organizations that are not part of tertiary-level academic study? We discuss this and other education matters below.

Automation in the workplace is another complication in the skills-market mismatch. Employees must continually update their knowledge as automation displaces those workers assigned to routine and repetitive tasks (World Economic Forum, 2020). Indeed, since the late 20th century, the number of jobs requiring routine cognitive tasks (like bookkeeping and filing) and routine manual tasks (assembly-line work) has plunged, while jobs requiring 21st-century skills like identifying and solving problems and complex communication (e.g., interpreting critical information) have expanded (Autor et al., 2003). This trend will intensify with automation. Although the estimated number of those working in occupations at high risk of automation varies, some data indicate rates above 50% in Latin American and the Caribbean (Bosch et al., 2018; McKinsey, 2017; Plastino et al., 2018; World Bank, 2016) (see Figure 1.1). The result is that people will change jobs and career tracks multiple times throughout their lives, while working with robots every day (Mateo Diaz et al., 2019).

Figure 1.1.
Percentage of workers in occupations with a high risk of automation



Source: Bosch et al., 2018

Since machines are not yet adept at simulating human behaviors and completing non-routine, low-predictability tasks, automation may spur the existing demand for workers with soft skills. Between 1980 and 2012 the share of all jobs in the U.S. economy calling for social skills–intensive occupations grew by 11.8%. Additionally, wages for occupations requiring strong math and social skills grew four times as much as wages for high math and low social skills (5.9% vs. 26%) over the same period (Deming, 2017). In Sweden, ROI for non-cognitive skills almost doubled, while the returns on cognitive skills among Swedish workers remained almost flat between 1992 and 2013 (Edin et al., 2017). Some sources estimated that by 2025, 97 million new jobs may emerge, while 85 million jobs may be displaced due to a new division of labor between humans and machines (World Economic Forum, 2020).

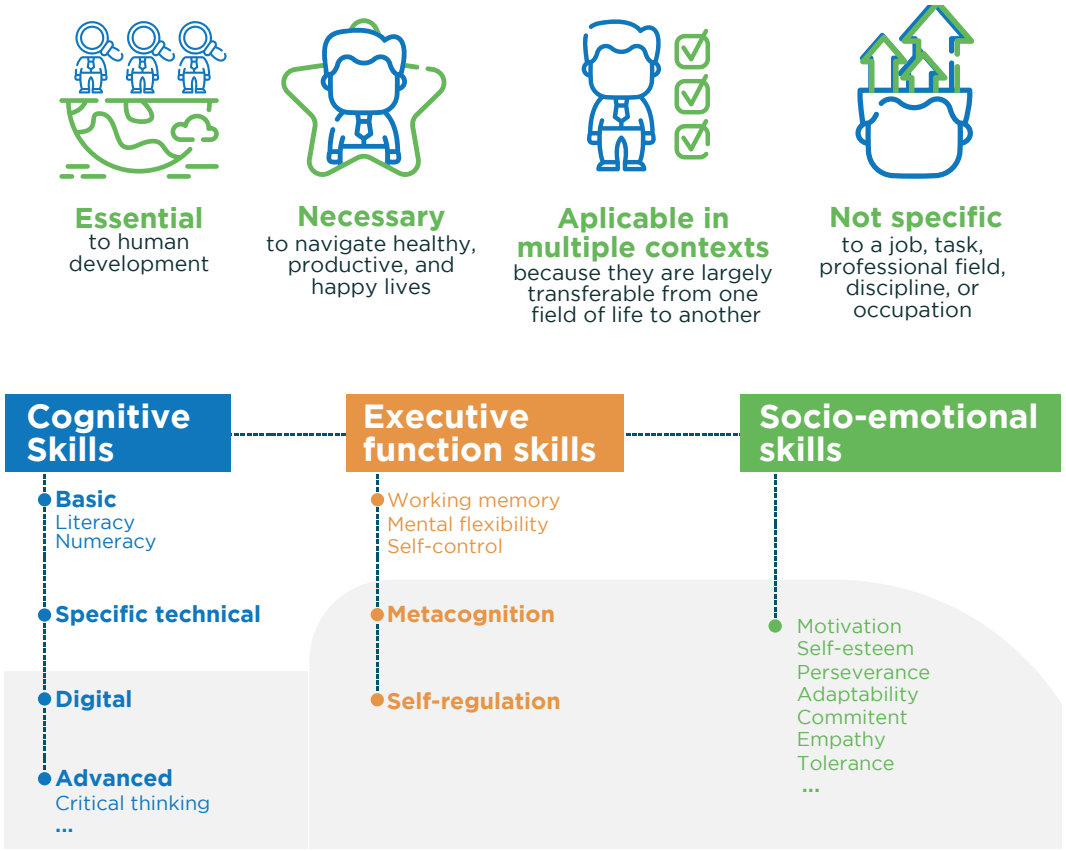
How are stakeholders in the education and labor markets trying to solve this? First, they are focusing on training for skills, not specialized tasks. The transferability of skills is key. Companies want trained workers to generate new connections between previously been disconnected ideas, manage unpredictable situations, use and understand human emotions to solve problems and conflicts, and generate new ideas. We are also beginning to understand that the capacity of a musician to solve a problem when she composes a symphony resembles the ability of an engineer to address a construction challenge (Van Broekhovena et al., 2020). Both challenges require being open to new ideas, employing divergent thinking, and maintaining a sense of flexibility; these attitudes, dispositions, skills, and knowledge are all **transferable** from one job to another.

These transversal, 21st-century skills are essential to human development; they are necessary to navigate healthy, productive, and happy lives; are not specific to job, task, profession, or occupation; and apply in multiple contexts because they are transferable from one field to another (Mateo Diaz et al., 2019). Specifically, 21st-century skills are:

> The set of foundational or transversal skills that include digital skills (such as computational thinking); advanced cognitive skills (such as critical thinking or problem-solving); skills related to executive function (such as self-regulation and metacognition, which have a dynamic relationship with cognitive skills), and socio-emotional skills, also called "soft skills" (such as self-esteem, perseverance, or empathy).
>
> Basic skills, such as literacy or math, are fundamental for the individual, but they are not a differentiating factor in the training requirements between the past and the present century. They are essential in both periods and therefore, not included as 21st-century skills (Mateo Diaz et al., 2019, p. 23) (see Figure 1.2).

In particular, digital skills have become necessary for work and life and for them to learn other skills and gain more knowledge (Carretero Gómez, 2021; Chung & Yoo, 2021). Digital skills also are in high demand in the labor market; they can help individuals navigate high-demand occupations and countries and to leapfrog ahead of rivals (Azuara Herrera et al., 2019; Mateo Díaz et al., 2020; Kalache, 2021).

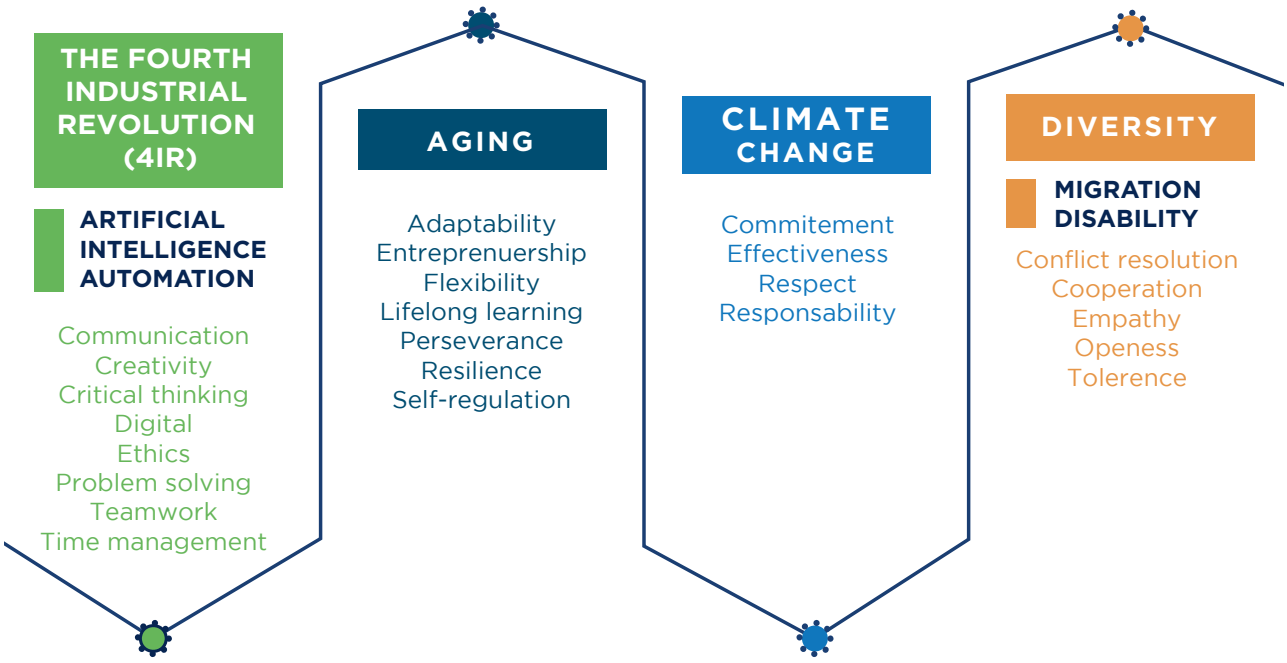
Figure 1.2.
21st century skills



Source: Mateo Diaz et al. (2019)

More important, these 21st-century skills can help people navigate new and significant challenges, such as the Fourth Industrial Revolution (4IR), climate change, migration, aging, and the pandemic (Mateo Diaz et al., 2019) (see Figure 1.3). Countries are facing uncertain labor markets and trends. Thus, they cannot focus exclusively on developing specific knowledge and skills; individuals cannot continue to miss opportunities to develop skills continuously throughout their lives (Auger, 2019; Mateo Diaz et al., 2019). Transversal skills help individuals self-regulate, persevere, adapt, and empathize; to show more resilience and self-confidence; and to have higher expectations for their future (Mateo Diaz et al., 2019). Growing evidence has indicated the relationship between socioemotional development and academic and professional performance (Duckworth & Seligman, 2005; Duckworth et al., 2007; Durlak et al., 2011; Heckman & Kautz, 2013; OECD, 2015 ; Wolvin & Lim, 2022). These skills are also related to individual and collective well-being regarding health, violence, and criminal behaviors (Brookings, 2015; Case & Deaton, 2017; Chernyshenko et al., 2018; Herrera et al., 2015; Kankaras, 2017; OECD, 2015 ; Wolvin & Lim, 2022). In sum, these 21st-century skills provide the foundation for individuals at any age to have productive and healthy lives, reinvent themselves continuously, learn to learn, and thrive within diverse communities (Mateo Diaz et al., 2019). The market is responding by focusing on these skills.

Figure 1.3.
21st centruy skills can help navigate challenges

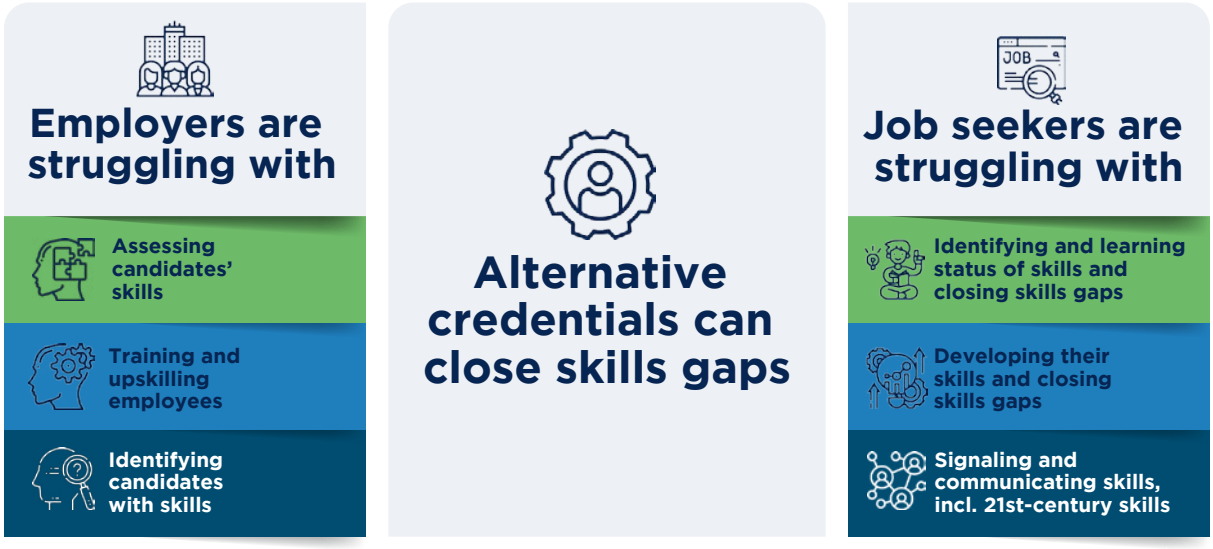


Source: Mateo Diaz et al. (2019)

Second, the doors are opening to new ways of learning, flexible learning trajectories, and alternatives to degrees (i.e., alternative credentials). You can learn on the job. We knew that, but this is now not just an option, but an imperative. Companies want to know what you can do, not just what you know. Degrees have been traditionally used to signal a set of knowledge and skills, but they are more like a black box when signaling competencies.

Both job-seekers and employers have struggled to identify, assess, showcase, and communicate skills—including soft, transversal, 21st-century skills. Job seekers do not have a means to identify their current skills in order to close the skills gaps. Given that degrees have limited capability to showcase soft skills and alternative credentials focus on technical skills (Markow et al., 2017), potential employees do not have ways to identify, develop, signal, and communicate their 21st-century skills. Employers are struggling to identify candidates with 21st-century skills, assessing their skills, and training and upskilling their employees (Adobe, 2019; Levy & Cannon, 2016; LinkedIn, 2019). Alternative credentials can help close these gaps (see Figure 1.4).

Figure 1.4.
Alternative credentials can help close skills gaps



Therefore, we are seeing greater demand for applicants who hold degrees and specific alternative non-degree credentials, applicants who, once hired, can be trained to perform a job in a short period. In fact, half the associate or bachelor's degree holders reported that they completed some kind of alternative credentials, while only one in five adults with high school education or less have completed a non-degree credential (Hanson, 2021).

Additionally, some postsecondary educational institutions provide short and practical training programs geared to the labor markets (Ferreyra et al., 2021). These alternative credentials are responding to a reality in which technical skills become obsolete quickly. This also accounts for the growing supply of education and training providers—not affiliated with higher-education institutions—that can respond quickly to shifting market needs at the pace of technological change. Changing the curriculum for a four- or five-year degree is a gigantic task (Mateo Diaz et al., 2022). But it's a simple matter to create or adapt the content of a month-long program to the needs of the industry.

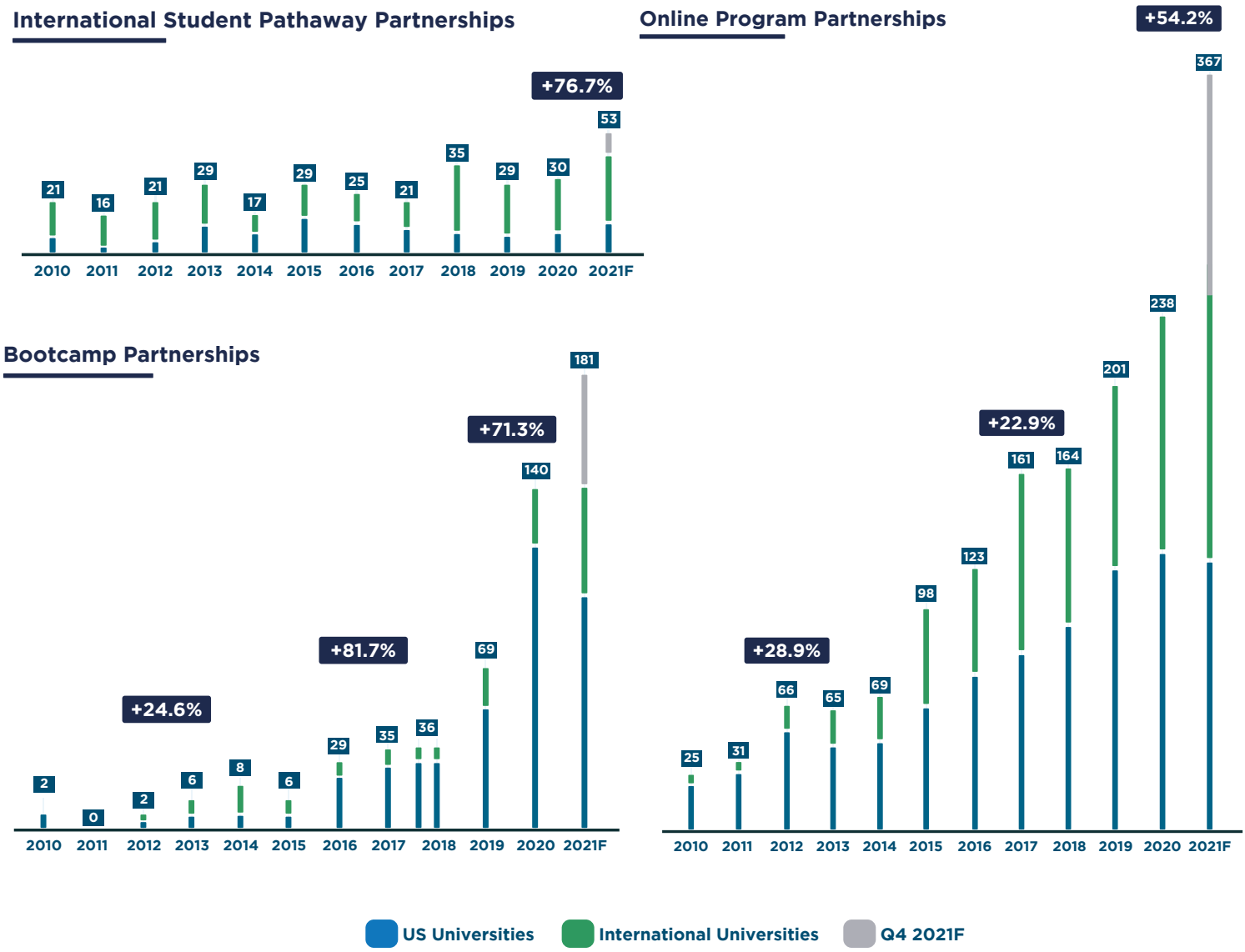
The third is education unbundling, another notable trend brought by the private sector. More and more education providers are developing unbundling and modular models according to Christensen logic and disruptive innovation (Christensen et al., 2011; Horn, 2014). Disruptive innovation is:

> the process by which a sector that has previously served only a limited few because their products and services were complicated, expensive, and inaccessible, is transformed into one whose products and services are simple, affordable, and convenient and serves many no matter their wealth or expertise.
>
> The new innovation does so by redefining quality in a simple and often disparaged application at first and then gradually improves such that it takes more and more market share over time as it becomes able to tackle more complicated problems. (Christensen et al., 2011, p. 2)

In other words, we are going to reimagine the production chain in education. For example, until now, K–12 education has been practically one block, and the educational paths quite fixed. Many countries want to adapt their formal education to this new reality, but they struggle with curricular reforms that may take several years to complete (Mateo Diaz et al., 2022). In a world of continual transformation, these reforms will be outdated by the time they're implemented.

Private initiatives are focusing on specific processes in the production chain in higher education: digitization of content, adaptation and personalization of learning, and certification and accreditation of competencies, among others (e.g., CB Insights, 2020). As the processes are ultimately interdependent, spillovers and changes will occur in other areas. Once content for new and pertinent skills is developed, new skills certificates and certifications will follow. As a result, postsecondary institutions have partnered with international student programs, bootcamps, and online platforms to offer more training and, as a consequence, more alternative credentials (Holon IQ, 2021). New partnerships bring more cross-border competition and collaboration.

Figure 1.5.
Different types of academic partnerships established by universities



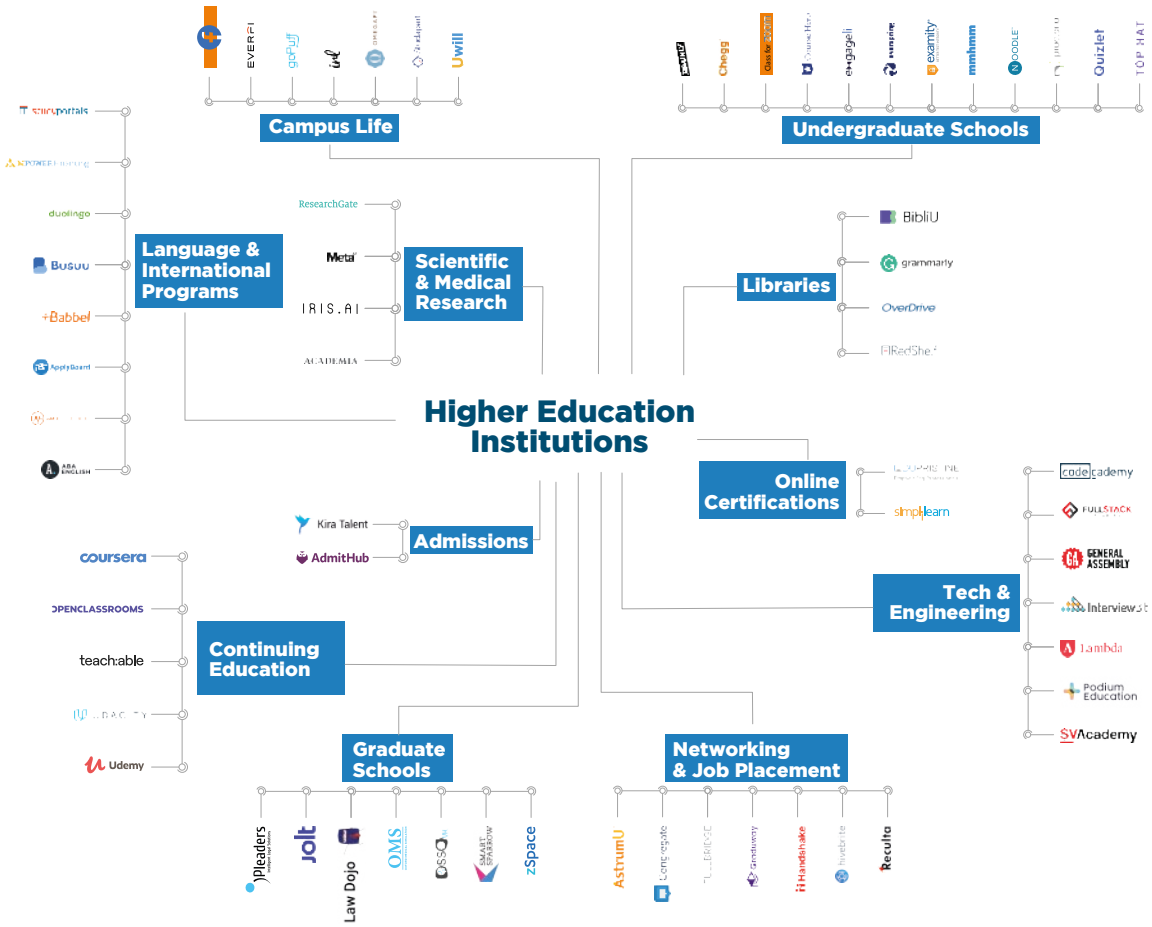
Source: Holon IQ (2021).

It was not previously possible to award college degrees for completed subunits—either you graduated and earned a degree, or you dropped out, with no credentials to show for your effort. Yet now some postsecondary schools in the United States and elsewhere may begin granting a credential to students who have completed part of a degree program.

Additionally, although degrees signal that individuals have completed a series of courses and passed the assessments in general, they do not actually convey what work skills a graduate possesses. These issues are becoming more salient because of the mounting skills gaps between education providers and labor markets. This is not consistent with the current needs of employers.

Fourth, these trends have implications for the diversification of supply—as seen with the progressive digitalization of education services (online and hybrid learning, online certificates and certification, and continuing education). Traditional postsecondary studies generally feature admissions offices, brick-and-mortar libraries, on-site research, campus life, undergraduate and graduate school, networking and job placement services, and continuing education services, among others. But other organizations specializing in these separate services have unbundled them (e.g., CB Insights, 2020) (see Figure 1.6).

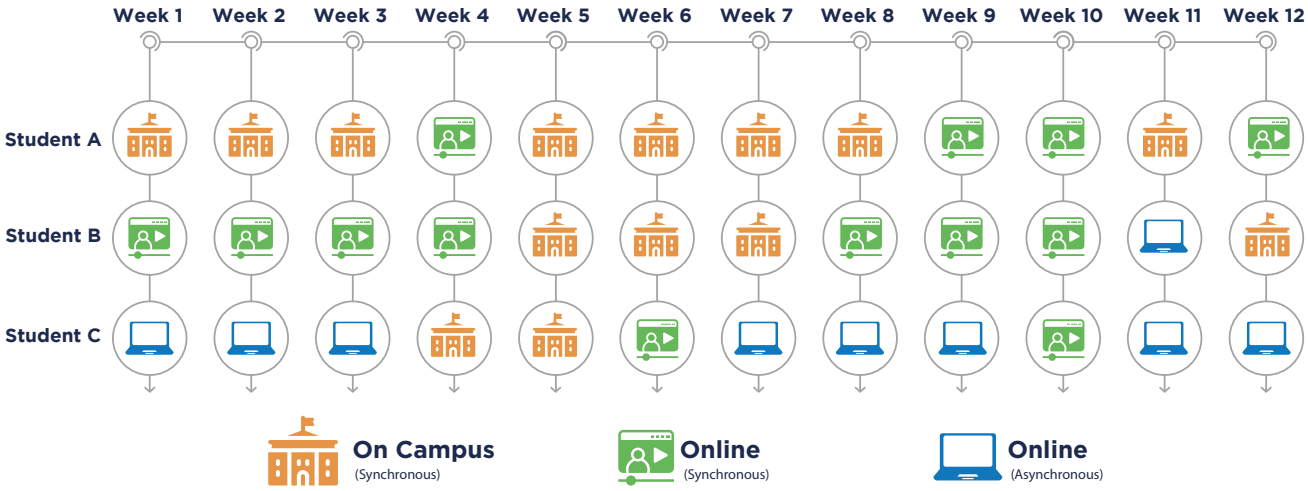
Figure 1.6.
Unbundling traditional postsecondary education: Companies that offer specialized services.



Source: Adapted from CB Insights (2020).

In these organizations, it has become the norm to provide learning and training content in synchronous and asynchronous forms, as well as online, hybrid, and "hyflex" forms in the education market (Holon IQ, 2021) (see Figure 1.7).

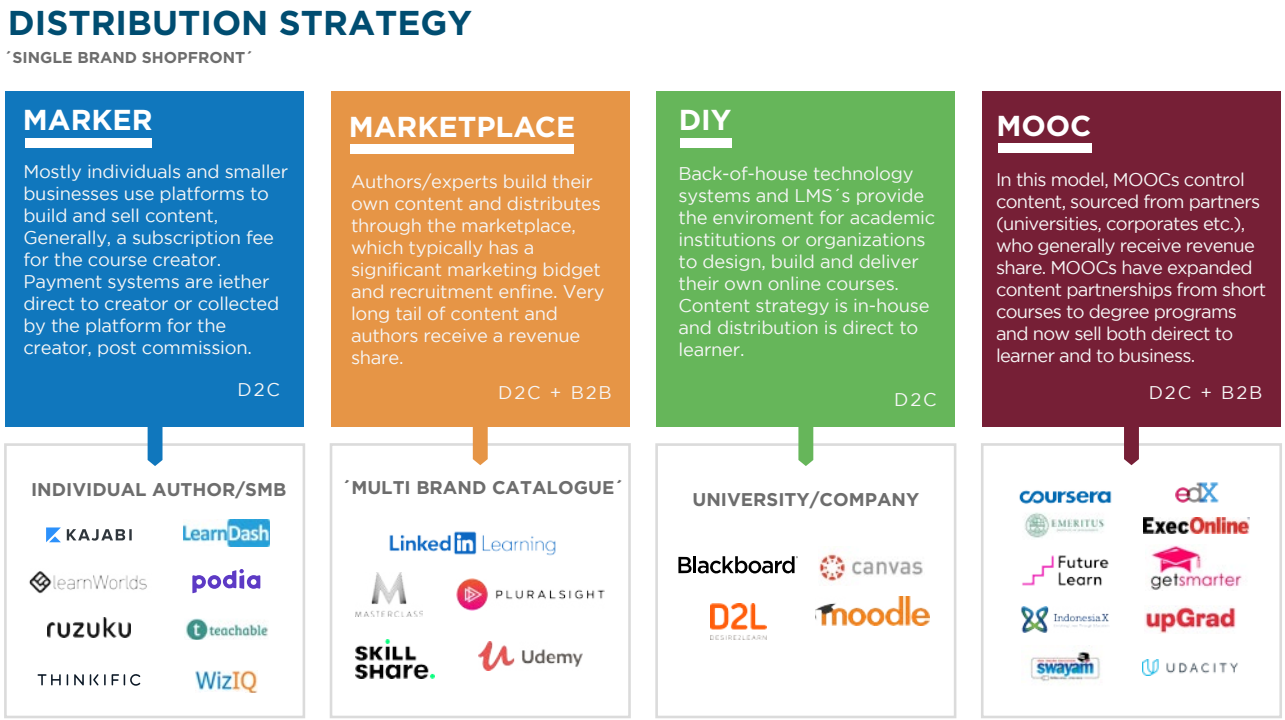
Figure 1.7.
Online, offline, hybrid, and hyflex learning models become the norm



Source: Holon IQ (2021).

Online learning can funnel new students to new markets, while post-pandemic education may adopt hybrid learning as its dominant form. Online course platforms have been diversified by the various content and platform providers (Holon IQ, 2021) (see Figure 1.8).

Figure 1.8.
Diversified online course platforms: From MOOC to marketplace



Source: Holon IQ (2021).

Digitalization also implies an increase in the education technology (EdTech) market. EdTech, or using technology in education, narrows the digital divide, diversifies tools for learning, provides personalized learning, and hones traditional and transversal skills alike (Mateo Diaz & Lee, 2020). Recent investments in EdTech are breaking global records, including in Latin America and the Caribbean (see Figures 1.9 and 1.10) (Holon IQ, 2021). Yet the sector still needs investment, particularly when compared with other sectors. Education and training are the fastest-growing industries, taking in more than US$ 6 trillion dollars globally. But digital investment is less than 3%, well below other sectors, including health (Holon IQ, 2020). In higher-education settings, IT spending is 4.3% of all institutional expenses (Lang et al., 2018). The underdeveloped EdTech market has much room for growth so it can address the magnitude of the challenges facing the workforce.

Figure 1.9.
Global venture capital investment in EdTech

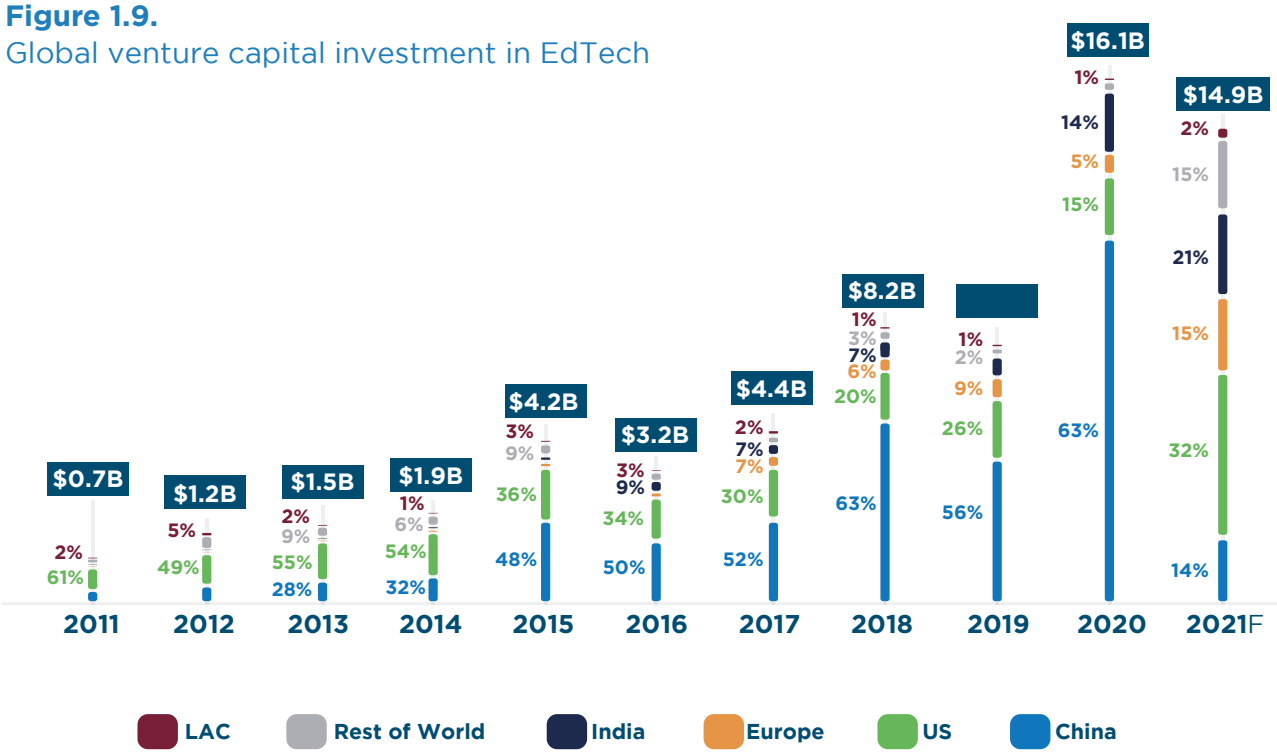
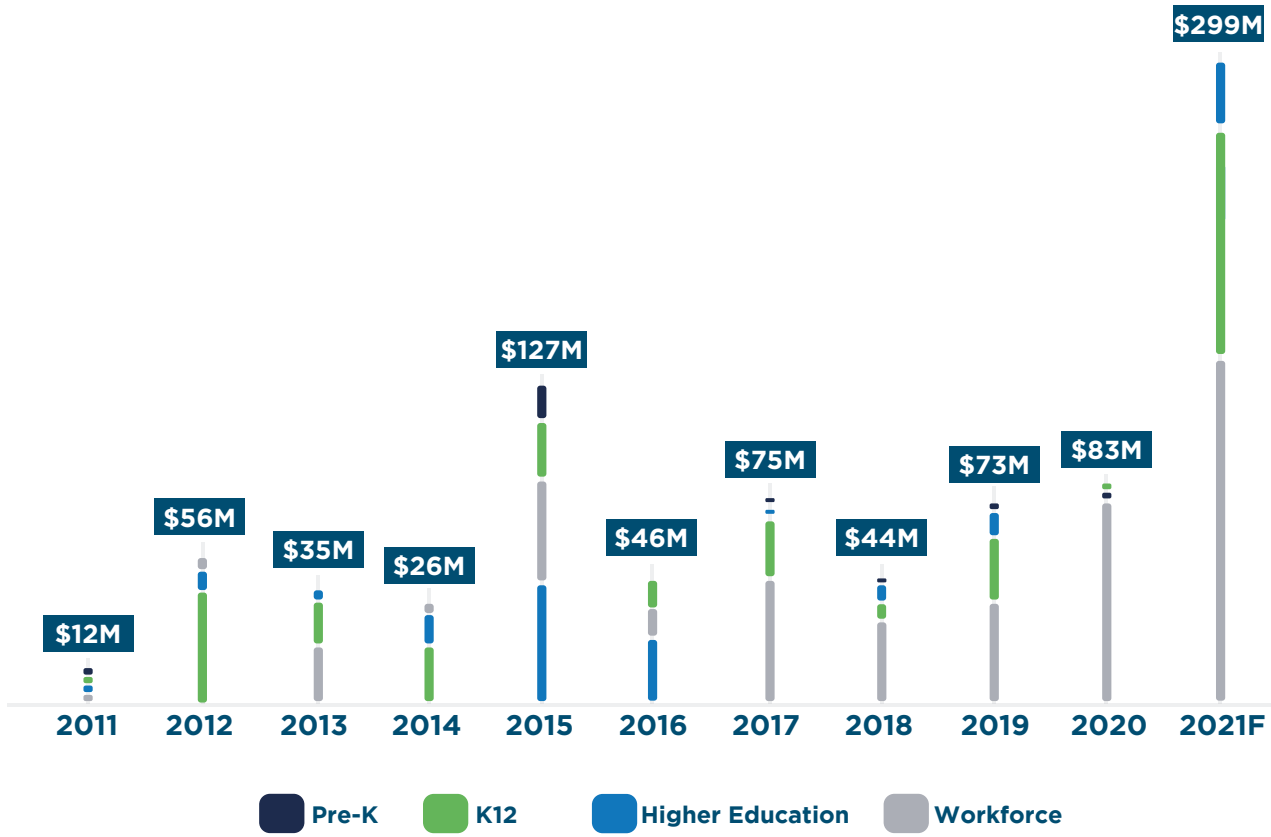


Figure 1.10.
Venture capital investment in EdTech in Latin America and the Caribbean



Source: Mateo Diaz et al. (2019)

Finally, consumer behavior will undergo major changes. Both supply and demand will become more sophisticated. Students will expect an array of learning options: online, offline, hybrid, and hyflex formats, as well as synchronous and asynchronous formats (Holon IQ, 2021). Students will be more demanding and expect concrete evidence of their investment by way of jobs and income. As consumers of training, teachers have also changed, becoming more open in their demand for training in, for example, digital skills.

This report provides an in-depth analysis of how the world is moving from degrees to skills-based systems that offer alternative credentials. In the following sections in this introduction, we discuss the declining value of degrees, the skills shortage, the impact of the pandemic on higher education, and ways to fill the skills gaps. In Part 2, we describe the alternative credentials now in the market. In Part 3, we review similarities (and differences) between degrees and alternative credentials. In Part 4, we examine the occupations in search of applicants with credentials. Finally, in Part 5, we discuss implications. Taken as a whole, this report provides insights into how education and labor markets are responding to fill the gaps in skills mismatch and shortage, and decreasing values of degrees as a signaling mechanism to employers and job seekers.

1.1. The decreasing value of degrees as a signaling mechanism for employers

Many students are not getting the returns on investments (ROI) they expected for their degrees (Belkin, 2020). In the United States alone, borrowers collectively owe over $1.5 trillion (on average, $34,000 per person); this makes student loans the second-largest consumer debt after mortgages (Mitchell, 2019). More than 2 million student loan borrowers have defaulted (Mitchell, 2019). Between 2016 and 2018, some 300,000 to 460,000 students defaulted on their loans every year in the United States (U.S. Department of Education, n.d.), and 5.3 million defaulters owe $116 billion (Federal Student Aid, 2021). In Latin America, annual tuitions vary from US$ 433 for vocational and technical training and US$ 1,243 for university in Peru, to US$ 2,694 annual tuition for four-year professional institutes, US$ 5,423 for five-year universities in Chile (Espinoza & Urzúa, 2016). Some countries in Latin America and Europe offer free tuition. "Free tuition" is not, however, mean the degree is free to the taxpayers who finance such tuition and bear the costs (Ferreyra et al., 2017).

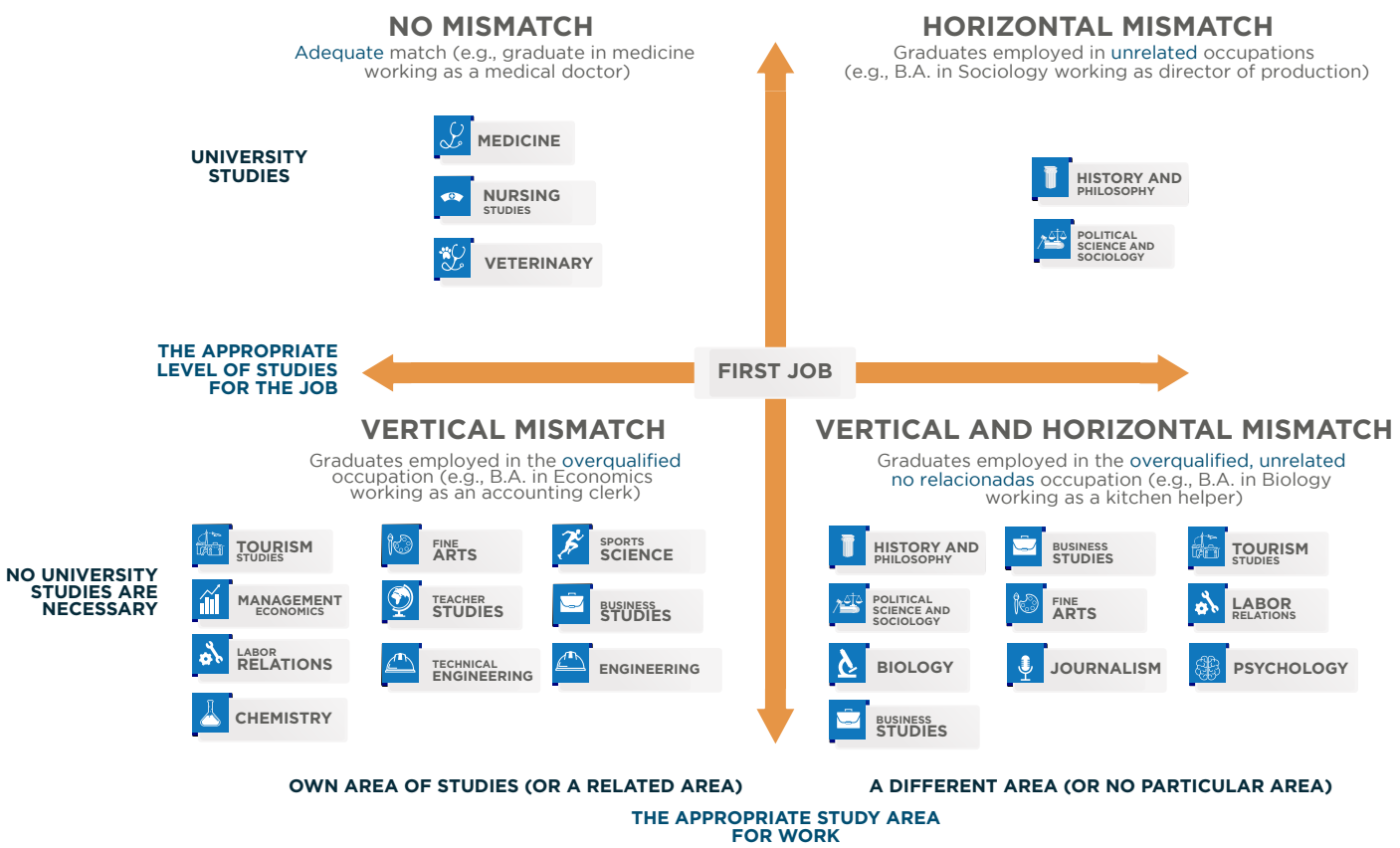
Six percent of public university and college graduates are not earning back even half of what they owe (Gillen, 2021; Marcus, 2021). Sixteen percent of private and public college and university programs showed no financial return on the investment (ROI) for U.S. tuition (Itzkowitz, 2021). Based on their incomes and tuition, half the graduates would recoup their costs within five years; a quarter would take 20 years or more, and more than half of them will never make enough to pay off their tuition (Itzkowitz, 2021). In Chile, 7% of higher-education students had negative ROI (Ferreyra et al., 2017). One factor that makes a difference is the major. While STEM and health fields in the United States show relatively quick returns, more than a quarter of U.S. humanities majors were worse off financially than if they never attended college, both in the United States (Copper, 2021a, 2021b) and Latin America (Espinoza & Urzua, 2016; Ferreyra et al., 2017). But 40% of recent college graduates in the United States hold jobs that do not require a college degree (Federal Reserve Bank of New York, 2021).

Historically, employers require conventional academic degrees when hiring and promoting employees, believing such employees have better skills and aptitudes (Gallagher, 2016). For example, when asked in 2018, half the human resource leaders said they believed that possession of an academic degree reliably represent skills and knowledge (Gallagher, 2018). According to an OECD study conducted between 2011 and 2018 across 39 countries, tertiary-educated adults show greater proficiencies than adults with no high school education (OECD, 2019). In the United States, more than half of full-time, entry-level hires in 2019 were recent college graduates (National Association of Colleges and Employers, 2019). Today, high school graduates are two times more likely to be unemployed than college graduates (Bureau of Labor Statistics, 2019).

Yet, employers are losing confidence in college degrees as evidence of ability to perform on the job. ROI on a tertiary-level education has fallen in Latin America patially because mismatches become evident between college graduate employees and needed job skills (Messina & Silva, 2017). Latin American employers have had more trouble finding talent compared with other regions. Three forces are at work:

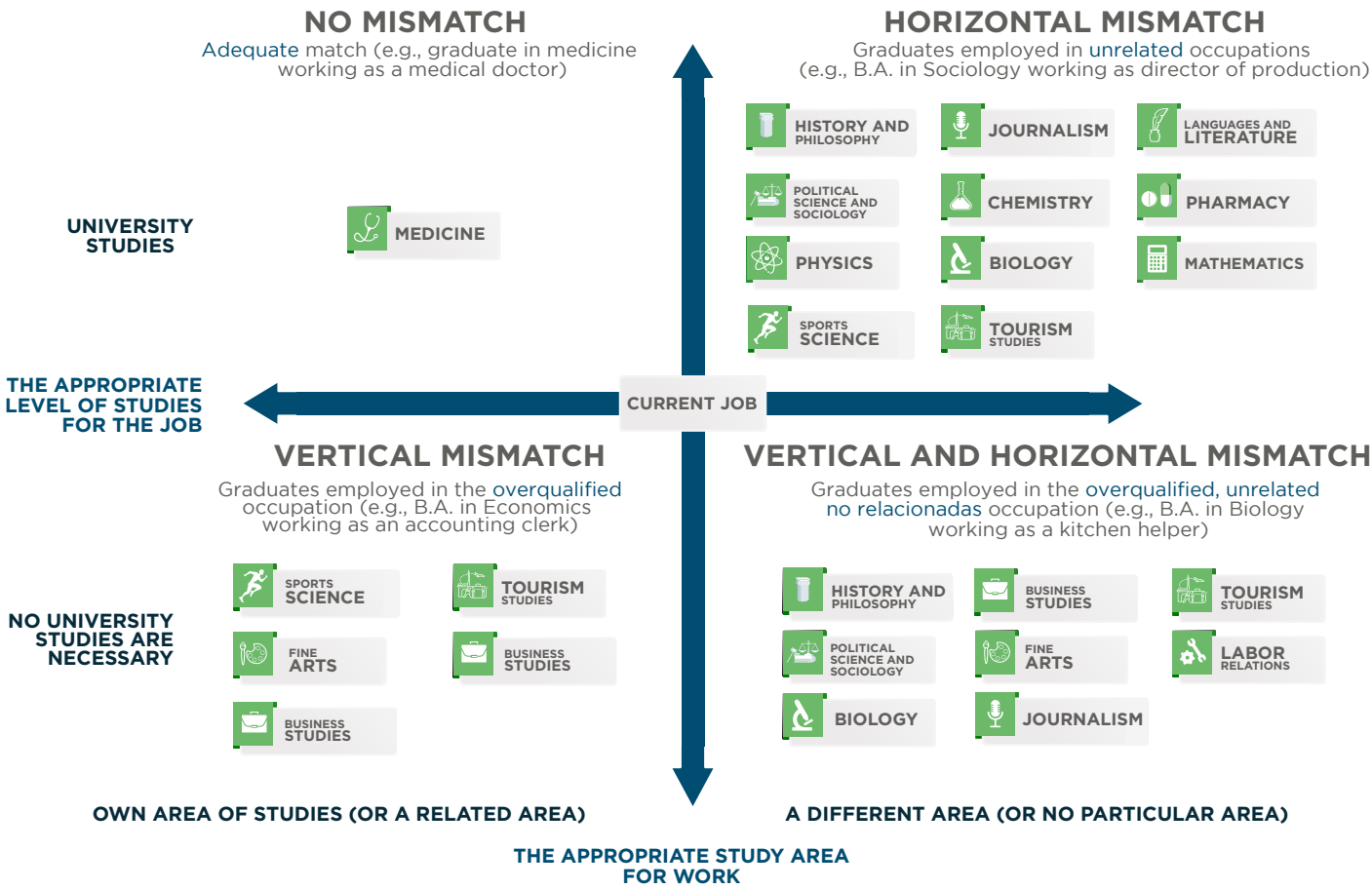
First, a skills mismatch exists between what industry needs from its employees and what the tertiary institutions feed into the market. Businesses doubt that colleges prepare students for the type of work they need in general (King & Zaharchuk, 2016; Shidu & Calderon, 2014)—MBAs are an exception (Graduate Management Admission Council [GMAC], 2021). Students and graduates alike agree they are not equipped with the skills they need for new jobs. For example, six out of ten adults lack basic information and communication technology (ICT) skills or have no computer experience (OECD, 2012, 2015). Students also find it difficult to speedily acquire new in-demand skills. Most American workers say they need continuous training to keep up with workplace changes and that they do not have the skills they need to get ahead (Pew, 2016). In Spain, except for medicine, most university graduates reported that they have been employed for jobs that mismatch what they studied vertically (i.e., graduates are overqualified for the occupation) and horizontally (i.e., graduates' occupations are unrelated to what they studied) after graduation (Salas-Velasco, 2021) (see Figures 1.11 and 1.12).

Figure 1.11.
Mismatch between university graduates' degrees and first jobs



Source: Salas-Velasco (2021)

Figure 1.12.
Mismatch between university graduates' degrees and current jobs



Source: Salas-Velasco (2021)

Second, employers find that degrees provide insufficient detail about a job applicant's job readiness. Some employers found that degree holders were neither ready for work (Weathers, 2014; Wolf, 2018) nor equipped with skills or otherwise prepared for the job (Cappelli, 2012). For example, a 2016 survey found that 20% of employers said applicants with bachelor's degrees did not have the necessary experience; a third of employers could not fill roles because they lacked qualified applicants (Crozier et al., 2018).

Third, there's a growing disconnect between what education offers and what jobs require. Students invest time, money, and effort in degrees that may not lead to a good job. For some individuals, a degree may not provide the knowledge and skills one requires for the jobs and occupations they are seeking. On the one hand, they may end up with abilities they might not otherwise have obtained (exposure to literature and psychology, writing and research skills, and so on). But on the other hand, one core function of higher education is to confer degrees that secure jobs (Gallagher, 2016).

U.S. colleges and universities confer over 4 million degrees per year, and most of the revenue and government support for higher education focuses on students earning credentials (U.S. Department of Education, 2018). Yet, companies are beginning to realize the degrees might not be necessary for all their new hires. For example, IBM estimated that 30% of its jobs (so-called new-collar jobs) do not require applicants with bachelor's degrees (Rometty, 2016; Rometty & Bush, 2018). Likewise, Apple, Google, IBM, Bank of America, and EY stopped requiring degrees for new hires. The U.S. federal government no longer has degree requirements for applicants as long as they have the appropriate skills (White House, 2020). They have introduced new career paths connected to non-degree credentials or alternatives to traditional college degrees, such as online learning, certificates, certifications, intensive programs, apprenticeships, vocational and technical education, associate's degrees, and early college programs (Find Something New, 2020).

With these powerful signals from the market, industries and individuals are becoming more skeptical about the value of degrees. Tertiary academic institutions will therefore need to rethink what they offer given the amounts of time and money students have recently been spending (National Center for Education Statistics, 2021). College and university degrees have driven the huge gross margins of education. In a 2016 Pew Research survey of U.S. adults, only 16% of the respondents (including 13% of those with at least a four-year college degree), believed a bachelor's degree prepares students "very well" for a good-paying job (with 51% saying "somewhat well") (Pew Research Center, 2016). Additionally, 12% responded that a two-year associate's degree prepares students "very well" (with 46% saying "somewhat well"). Conversely, a quarter of Americans (26%) say certification programs in a professional, technical, or vocational field prepare students "very well" (52% saying "somewhat well") (Pew Research Center, 2016).

Galloway argued that the admissions department represented the greatest value in a university degree—not the education and not the professors. In other words, in recruiting students, admissions departments at very selective institutions are identifying a pool of exceptionally prepared future job holders with the most thorough and arduous entrance processes, including tests, references, background checks, and even social media vetting (Walsh, 2020).

1.2. A skills mismatch and shortage

Every year, employers around the world spend more than $120 billion on hiring. Despite such investment, the lack of critical skills has been a serious and mounting concern for most CEOs (PwC, 2020). Global estimates point to alarming shortages of skills in the labor market.

Fifty-five percent of the world's business leaders believe their country's education system provides the right programs to ensure lifelong learning and skills development (King & Zaharchuk, 2016). Analysts say that, by 2030, the world may see a shortfall of more than 85 million workers with the needed skills, with $8.5 trillion unrealized revenue opportunities (Korn Ferry, 2018). These deficits arise not only from the speed with which the market is transforming and adapting to technological change, but also to the difficulties formal education and training systems face as they see and respond to these new needs.

In a 2018 report on talent shortages and their impact, 45% of organizations said they cannot find employees with the skills they require (ManpowerGroup, 2018). For large employers, the percentage rises to 67% (ManpowerGroup, 2018). Almost a third of employers cite lack of applicants as the main reason they cannot fill roles; 20% say applicants do not have the necessary experience (ManpowerGroup, 2018). More than a third are relaxing their education and experience requirements in order to fill positions (Crozier et al., 2018). Consistent with those numbers, other studies show that only 41% of organizations have the people skills and resources required to execute their business strategy (LaPrade et al., n.d.).

In Latin America and the Caribbean, the skills gap and the education-workforce mismatch have also been critical issues. Leaders of academic institutions shared that preparing students for relevant job skills for future employment is a key challenge (Inter-American Development Bank et al., 2022). Thirty percent of these regional leaders cite changing workforce needs as a key challenge for institutions in Latin America and the Caribbean; 26% cited student employability. These employers have struggled to find talent, more so than other regions. Degree holders find it difficult to get jobs in their field of study.

Jobs and occupations are changing quickly, and so are the pertinent skills. On average, U.S workers spend 4.2 years in a position (U.S. Bureau of Labor Statistics, 2020), change their careers and occupations more often than before. In addition, some estimates suggest that 65% of students entering primary school today will have jobs that have never before existed (World Economic Forum, 2016). According to Organization for Economic Co-operation and Development (OECD) estimates, 14% of jobs in OECD economies are highly automatable, and another 32% could undergo substantial changes (OECD, 2019). By 2025, 97 million new jobs may emerge, while 85 million jobs may be displaced by a division of labor between humans and machines (World Economic Forum, 2020). Since 2010, 13 million new jobs have been created in the United States, 60% of them requiring digital skills (Muro et al., 2017). Across industries, 35% of the skills needed for jobs will become outmoded (World Economic Forum, 2016). This means that, over their life cycles, individuals will need to change careers and occupations more often and interact daily with robots—machine colleagues that will be an integral to the production and value-generation processes.

Skills are changing in two dimensions: how we work together, and what we do. A LinkedIn analysis (Pate, 2020) finds that the top five most in-demand soft skills are creativity, persuasion, collaboration, adaptability, and emotional intelligence. These skills are necessary for collaboration, and they also tend to be consistent across analyses. With automation, 92% of hiring managers believe that candidates with soft skills become more valuable hires (LinkedIn, 2019). Specifically, the skills sought most frequently in job postings include communication, creative problem-solving, leadership, collaboration, and strategic thinking (Adobe, 2019; Levy & Cannon, 2016; Lippman et al., 2015; Perkins Collaborative Resource Network, 2020). On the other hand, the most-valued technical, or hard, skills include blockchain, cloud computing, analytical reasoning, artificial intelligence, UX design, business analysis, affiliate marketing, and sales. These skills continue to evolve rapidly.

Skills get outdated more quickly than ever before. Exacerbating the issue, the rate at which professional skills become obsolete is speeding up. For example, software engineers need to redevelop their skills every 12 to 18 months (Pelster et al., 2017); 35% of job skills will change across industries (World Economic Forum, 2016). One in four people are already dealing with a mismatch between the skills they have and the skills they need for their job (World Economic Forum, 2017). Today, the half-life of a learned skill is estimated at five years; it is at 2.5 years for technical skills (Thomas & Brown, 2011). In other words, the value of skills previously fell by half (or became irrelevant) in two to five years. Conversely, the training time required to close a capability gap increased from 3 days in 2014 to 36 days in 2018. In just four years, the time needed to close a skills gap soared (LaPrade et al., n.d.). Some new skills take more time to acquire because they are highly technical, yet these skills are also changing rapidly (LaPrade et al., n.d.).

Such rapid perishability of skills implies heightened demands for upskilling and reskilling. Emerging jobs require higher-level skills (Hwang & Kim, 2020). Companies estimated that 40% of their workers will need reskilling for six months or less, and 94% of business leaders expected their employees to pick up new skills on the job—a sharp increase from 65% in 2018 (World Economic Forum, 2020). Nearly two-thirds of new jobs required either high- or medium-level digital skills (Muro et al., 2017). Specifically, the number of computer and mathematical occupations has risen nearly 80%, particularly in applied occupations (e.g., computer network support specialists, database architects).

With the labor market changing so dynamically, skills can be the ticket (or at least a part of it) to new jobs, especially for people without degrees. For example, researchers in the United States find a big overlap between the skills required in low-wage jobs and many higher-paying occupations, creating a sizable landscape of opportunity (Blair et al., 2020; Opportunity@Work, 2020). New professional clusters are emerging. Some of these clusters, including Data and AI, and cloud computing, require expertise in digital technologies, whereas other professions emphasize business and industry skills (World Economic Forum, 2020). Additionally, from 2010 to 2017, 13 million new jobs were created in the United States, 60% of them requiring medium- to high-level digital skills (Muro et al., 2017). These are full-time jobs with the potential to pay workers a living wage, so they can move into the middle class. Such jobs also represent a lifeline to working-age adults and struggling families, especially for the two-thirds of Americans who do not have a college degree (Muro et al., 2017).

Still, CEOs see enormous challenges in addressing their organizations' skills gaps and building programs to retrain, reskill, and upskill workers. Reskilling and upskilling employees produce beneficial outcomes (PwC, 2020). Given the cost of severance payments and hiring, reskilling is the most attractive option, despite the cost. For their part, employees are also willing to reskill and upskill, spending two days per month training to upgrade their digital skills (PwC, 2018). Yet, only 18% of global organizations said they made notable progress in establishing an upskilling program (PwC, 2020). As many as 60% of executives struggle to keep workforce skills current and relevant (King & Zaharchuk, 2016).

1.3. The impact of COVID-19

Despite these trends, tertiary academic institutions have not fully adapted their models to a new reality. Rather, they have taught students just as they have in the past. Seventy percent of the educators surveyed said they did not think their curricula emphasized creative problem solving, because of lack of time, training, and access to new hardware and software (Adobe, 2019).

How are we preparing students for these new jobs?

The pandemic caused by COVID-19 suppressed school attendance worldwide. In the United States, community college enrollment decreased by 9.5%. Although graduate student enrollment rose 4.6%, undergraduate enrollment fell by nearly 5% (National Student Clearinghouse, 2021a). The number of high school graduates going straight to college fell 6.8% during the pandemic among mostly low-income and indigenous/minority high school students (National Student Clearinghouse, 2021b).

With the pandemic came the nearly mandated rise in remote learning. Meanwhile, renewed skepticism about the value of academic degrees emerged. Since March 2020, the global shutdowns of schools across the board have brought nearly inestimable harm to younger children (UNESCO, 2020; Vicentini, 2020). For college students, however, academic instruction moved from lecture halls to video conferences, teaching was conducted in much the same way but in a digital venue (Nelson, 2020). Only a few teachers were trained, however, for remote instruction, and many students struggled with connectivity and equipment, especially in Latin America (Vicentini, 2020). University course offerings under sometimes dire social and economic conditions become less attractive given the expense of tuition (e.g., more than $50,000 in the United States) for Zoom or Google Hangouts (Goldberg, 2020). More than three-quarters of those students surveyed said they felt they were not receiving a quality learning experience (OneClass, 2020).

Approximately 27 million tertiary-level students in Latin America were out of school during the pandemic; many of them may not return (World Bank, 2021). In Peru, the dropout rate grew from 12% to 18.2% (TV Perú, 2020). In Brazil, 48 out of 69 federal universities suspended classes altogether without offering any learning alternatives; 14 schools offered remote learning (Becerra et al., 2020). Schools declared they lacked "a pedagogical structure that aligns to a new post-pandemic reality, where the student is not quite [as] close to universities as they used to be" (Inter-American Development Bank et al., 2022, p. 14). The "college experience" has been hollowed out, while degree-certified learning has shrunk too (Walsh, 2020). Some predicted that a handful of elite universities might emerge to monopolize online higher education by collaborating with the big tech companies to expand enrollment and affordability. Conversely, some brick-and-mortar universities may close their doors (Walsh, 2020).

Not all news was bad. The pandemic has created opportunities. Universities were forced to go online (Vicentini, 2020). Maintaining education online could prove beneficial after the pandemic. Before the pandemic, Latin American universities had not invested in ICT for pedagogical purposes, applying technologies primarily to administration (OECD, 2015; Perez Sanagustin et al., 2016). If well-implemented, online coursework could expand access and affordability while improving quality by using flipped or adaptive learning; to meet students' needs, teachers could develop asynchronous classes online and on-campus (Taparia, 2020). Distant learning could become a new normal (Goldberg, 2020). Those college students who can afford rented houses, so-called collab houses, worked in pods with friends during the pandemic and attended classes remotely.

Most institutions will reopen and attempt to operate as before. But the pandemic points to the need for institutional reform. Institutions and staff must transform how education is delivered, revise their pedagogical approach, learn how to navigate an unpredictable future, and be student-centered (Nelson, 2020).

The institutions that renew themselves will survive (Nelson, 2020). Some universities have launched online degree programs that offer the same degrees at a fraction of the traditional cost. For example, Georgia Tech, one of the top engineering schools in the world, started an online master's program in computer science. Costing around $6,600 for the full degree, 10,000 students have enrolled. The University of Illinois has launched an online M.B.A. for $22,000. The Coursera online bachelor's degree program for the University of North Texas can cost $330 per credit, totaling up to $14,850 for the full college program. Finally, Coursera's online master's programs costs around $22,000 for the entire program.

1.4. The opportunity for filling the skills gap

Given the rigidity and duration required by academic-degree programs and the speed of reform, it may take longer to close the demand-supply gaps, especially for certain skills, via traditional education and training systems. And, it may not be feasible for these traditional systems to undertake (Grob-Zakhary & Hjarrand, 2017), although some traditional educational institutions address skills shortages better than others (Arias Ortiz et al., 2020). In a surprisingly pragmatic move, the private sector is progressively transitioning to the unbundling of services. With modules, one can easily customize services. Company and individual alike can take what they need instead having to take on the entire package or bundle, generating efficiencies not only in terms of time for design and adaptation, but also in terms of financial investments to bridge the gaps.

Major employers with leading global brands now provide professional alternative credentials and education curricula, often in partnership with degree-granting institutions (Swift et al., 2020; Uranis et al., 2022) in an approach that disrupts the traditional higher-education market (Leaser et al., 2020). Tech companies are creating alternative credentials to fill the skills gaps they're encountering; in some cases, credentials take the place of degrees. For example, in 2018, Google launched an IT-support professional certificate program on Coursera, which takes 8 to 12 months. Additionally, Google plans to launch new certificate programs for aspiring students. They take only six months to complete, at a fraction of typical college costs, for high-paying and high-growth occupations. As of February 2022, Google has been offering certificates in IT support, data analytics, project management, UX design, and android development (Google, 2022), treating these certificates as equivalent to four-year degrees. Google-certificate graduates gain access to an exclusive job platform where they can apply to jobs from over 150 companies, such as Deloitte, Infosys, Snap, Target, and Verizon (Bariso, 2020; Google, 2022). IBM has issued more than 1.5 million badges to more than 400,000 learners across 195 countries (Daniels, 2018; Fain, 2019). People with badges at IBM can find existing roles by using their skills' metadata, while the company can identify employees who possess skills of the future (Fain, 2019). Meanwhile, community colleges and universities integrate professional certificates from tech companies, such as Google and IBM, into their academic programs and degree curricula (Leaser et al., 2020). Higher-education institutions have examined how they can integrate high-quality industry certifications into their bachelor's degree programs to help their students earn credentials with labor market value (Swift et al., 2020).

Education technology and the booming EdTech market create new opportunities for less resource-intensive teaching (e.g., learning with fewer teachers or less time in a physical classroom), training, and alternative credentials (cheaper, briefer, more to the point), such as bootcamps and online learning. Spending on education technology exceeded $13.2 billion in the United States alone in 2015. The education technology market is expected to double around the world and reach $341 billion by 2025 (Holon IQ, 2019). A study that reviewed 126 education technology interventions (J-PAL, 2019) showed some examples of how using technology could make a big difference. In fact, education software permitting users to develop specific skills at their own pace showed promise in improving learning outcomes, particularly in math. The study also showed that a combination of online and in-person instruction works as well as traditional in-person-only classes, indicating that blended learning can be cost-effective. Additionally, COVID-19 expedited the evolution of technology in education. Teachers, students, and schools are now forced to use technology, overcoming decades of reluctance, resistance, and inertia. In future semesters, schools will provide better remote-learning experiences.

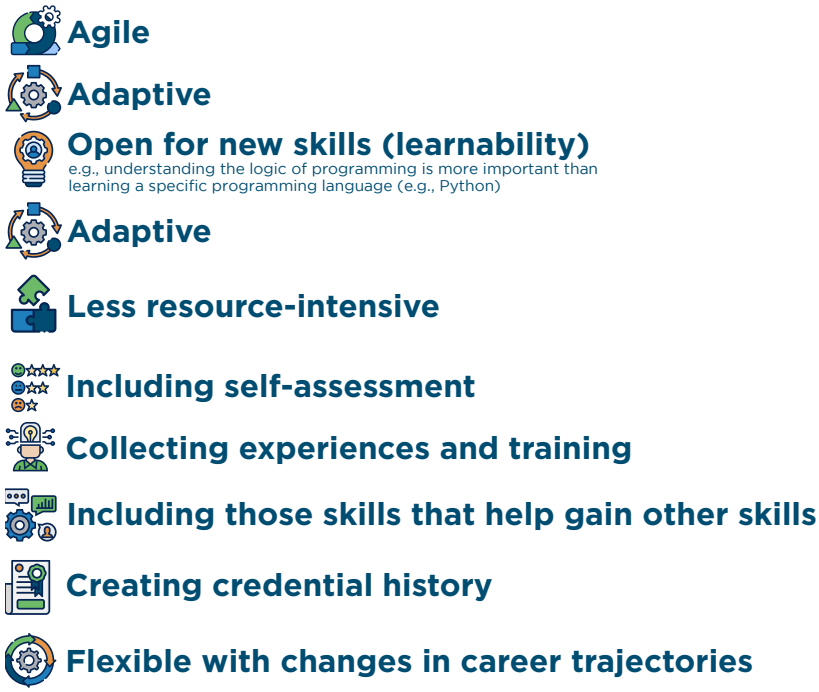
Tech companies, too, are entering education markets. To scale and innovate workplace learning, Amazon hired open education pioneer Candace Thille for its Global Learning Development Team (Lederman, 2018). TikTok plans to invest in education, commissioning experts and institutions to produce "micro learning" content for its platform (Iqbal, 2020). The platform earned user interest with an educational video using the hashtag #LearnOnTikTok and gaining more than 7 billion views.

They also build alternative education and training programs. Amazon Web Services (AWS) works with universities to launch cloud-computing programs worldwide. Students will learn through the curriculum mapped for skills required by AWS, such as cloud architecture, data analytics, and cybersecurity (AWS, 2020). IBM created the Pathways in Technology Early College High Schools (P-TECH) initiatives to close skills gaps while opening career paths to new-collar workers who do not have bachelor's degrees. P-TECH schools span grades 9–14 for 6 years. P-TECH schools enable students to earn both a high school degree and a two-year associate's degree in a STEM field at no cost. Students participate in a range of work experiences, including mentorship, paid internships, and worksite visits. Upon graduation, students have academic and professional skills required to either continue their education in a four-year institution or move into entry-level careers in IT, healthcare, and manufacturing (IBM, 2020).

How do employers know whether applicants have the right skills? Many companies and governments are eliminating degree requirements and hiring instead according to skills. But how do employers know that applicants have the right skills? What are they using to ascertain a candidate possesses the knowledge traditionally signified by a degree? Candidates with the requisite technical and soft skills were less common (Adobe, 2019; Levy & Cannon, 2016). There was a concomitant difficulty among employers to find qualified candidates with both soft and hard skills. Employers shared their concerns about the lack of candidates with soft skills in the market (Adobe, 2019). Nearly 90% of hiring managers feel that their bad hires typically have poor soft skills (LinkedIn, 2019). Since employers found that university degrees are not enough to signify possession of the required skills, they are demanding that job candidates prove their skills through tests and other measures. IBM stated that about 20% of its new hires each year do not have a four-year degree (Fain, 2019).

In this dynamic environment, alternative credentials have become more important than ever. More affordable and versatile credentials are becoming more valuable than traditional degrees (Non-Degree Credentials Research Network [NCRN], 2019). Instead of and/or in addition to degrees, learners turned to short-term credential classes during the pandemic, with a 70% increase in alternative credential enrollment to 8 million learners (Belkin, 2020). Alternative credentials can provide short-term pathways to employment (Workcred, 2020). Earning a bachelor's degree can take three to four years and cost more than $40,000 to $150,000 (College Board, 2021). Thus, college degrees are "out of reach for many Americans, and you should not need a college degree to have economic security. We need new, accessible job-training solutions—from enhanced vocational programs to online education—to help America recover and rebuild," said Kent Walker (2020), SVP of Global Affairs at Google. In response, a variety of alternative credentials have emerged, such as micro-credentials, coding bootcamps, MOOC-based certificates, industry-recognized certificates, and digital badges. These alternatives to degrees need to be agile, adaptive, open for learning other skills, and less resource-intensive, among other things (Figure 1.13). Experts say that assessment in universities and colleges and their credentials need to be authentic, accessible, appropriately automated, continuous, and secure, using technology to address problems and opportunities (JISC, 2020).

Figure 1.13.
Features needed for alternatives to degrees

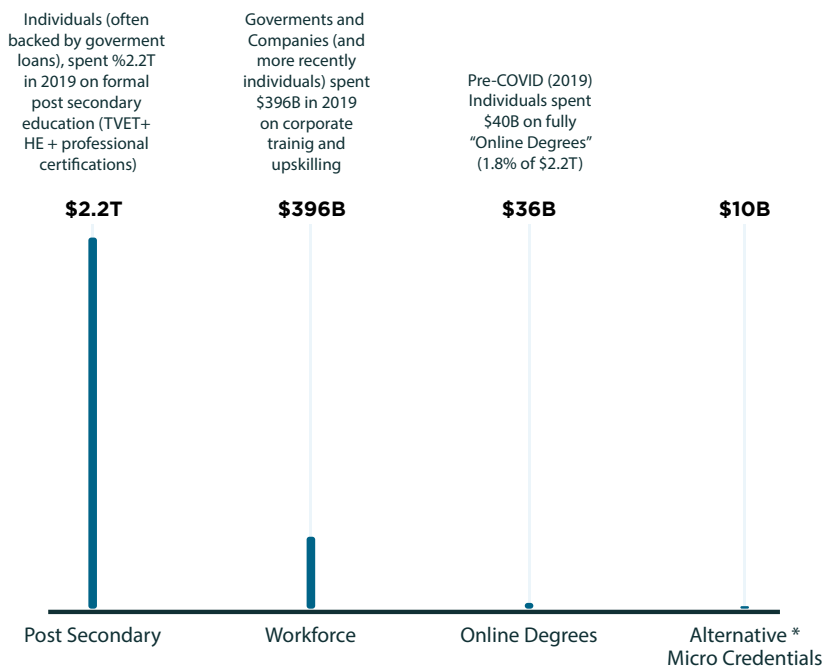


Governments are slowly moving forward with alternative, non-degree credentials. For example, the Government of Ontario has released Budget 2020, which includes a $59 million investment into a province-wide micro-credential strategy (Academica Group, 2020). The New York State Department of Labor is also partnering with Coursera, the leading online training provider, to provide access to nearly 4,000 programs across high-growth industries that can hone worker skills in data science, business, and technology (New York State, 2020).

Uses and awareness of alternative credentials are increasing in the education and labor markets. Most hiring managers in the United States recognize the importance of alternative credentials, such as micro-credentials and digital badges, for hiring and promotions (Gallagher, 2018). Hiring managers have already begun recruiting individuals with verified certificates (MOOC certificates), such as digital badges (14%) and micro-credentials (10%), although many of these recruits also had degrees (Gallagher, 2018). Thirty percent of hiring managers have encountered individuals with these certificates in the recruitment process (Gallagher, 2018). Applicants who completed the MOOC data science program may earn $2,790 to $7,820 more (Hadavand et al., 2018). Also, 72% of educational institution leaders believe that introducing credentials to recognize capabilities learned within a curriculum can have an impact (King & Zaharchuk, 2016). In the following chapter, we will look into the micro-credential market in detail.

However, the micro-credential market is still much smaller than the higher-education market, possibly showing a potential to grow. Globally, learners collectively spend $2.2 trillion on formal postsecondary education, including TVET, higher education, and professional certifications. Conversely, students collectively spend around $36 billion on online degrees and only $10 billion on micro-credentials (HolonIQ, 2021). Specifically, the online courses market is $3.8 billion, the professional certifications market is $2.9 billion, the micro-credential market is $2.3 billion, and the bootcamps market is $0.9 billion (see Figures 1.14 and 1.15).

Figure 1.14.
Global postsecondary, workforce, online degree, and micro-credential market estimates (in US$)



$2.2T Global Post Seconday Market. Offline + Online Vocational, Higher Education ad Professional Certifications.

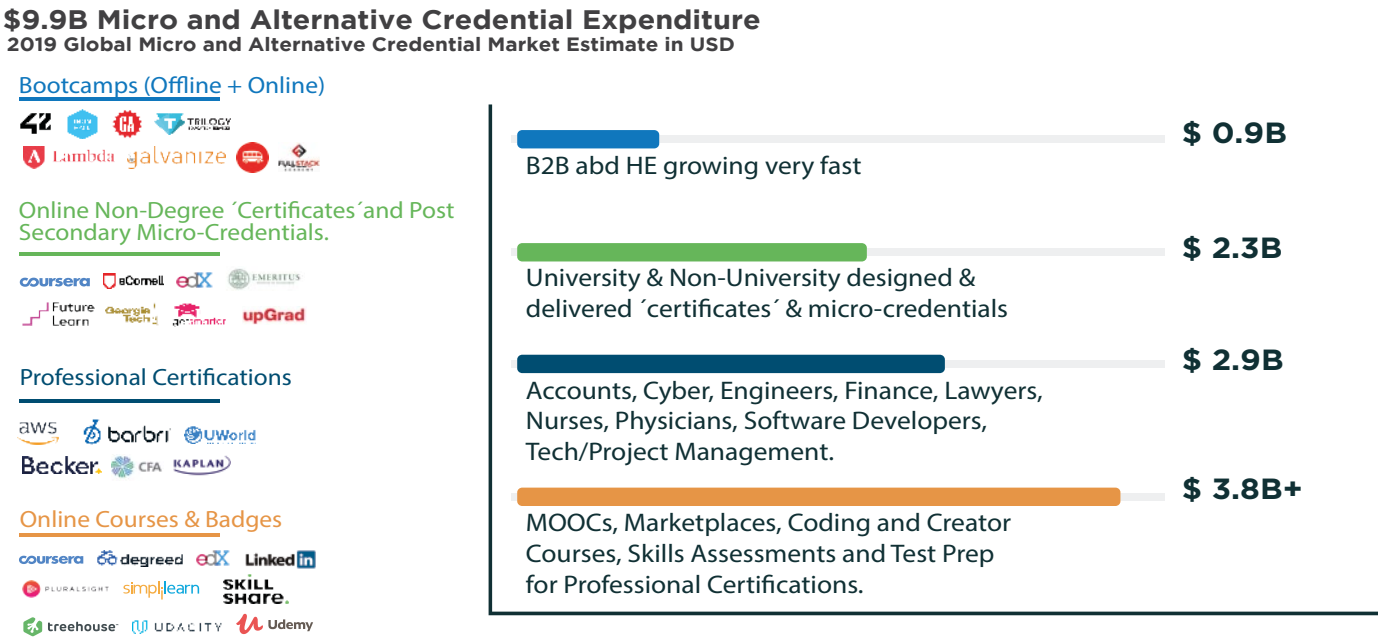
$396B Global Workforce Market. Corporate Training and Up-Skilling.

$36B Global Online Degree Market. Total spend on fully/mostly degrees. Part of the $2.2T post-secondary market.

$10B Global Alternative and Micro Credential Market. Total spend on alternative and micro-credentials. Splt across the %2.2T post-secondary and %396B workforce training markets.

Source: HolonIQ, 2021

Figure 1.15.
Global micro-credential market estimates (US$)



Source: HolonIQ, 2021

Various alternative credentials coexist in the market. These alternative credentials can fill the skills gap and address the skills-market mismatch, complementing or even replacing degrees in some cases. In Part 02, we will introduce them in detail.

Part 02:

A New Market in Education and Training

Part 2:
A New Market in Education and Training

2.1. A round of introductions: What are alternative credentials?

The United States alone has at least 967,734 unique credentials (Credential Engine, 2021). There are an estimated 549,712 alternative credentials that range from digital badges to fully accredited certificate programs (Credential Engine, 2021). Even MOOC-based micro-credentials have many options, yet little consistency (Pickard, 2018). There are different types of alternative credentials. The concept of alternative credentials is not fully developed. We have not yet reached a consensus on how we label and define them.

To date, no comprehensive survey of the alternative credentials exists (NCRN, 2019). Anecdotal evidence points to mounting numbers of alternative credential programs and related occupations between the 1980s and 1990s (Albert, 2017; Gallagher, 2016). Still, governments do not track alternative credential attainments, nor do they require certification entities to register with any agency.

Figure 2.1.
Credential as umbrella term

Source: Workcred, 2020.

We explore the definitions of alternative credentials used in the markets. Before looking at specific credentials, we will review key terminology.

Credentials are a qualification, achievement, and evidence of authority used to signify that individuals are suitable for a line of work (Bartlett et al., 2005) "Credential" is an umbrella term that encompasses certificates, certifications, badges, licenses, and degrees (Workcred, 2020, p. 4) (see Figure 2.1).

Certification is an act of certifying or the state of being certified after passing the certification exam. In the alternative credential market, a certification is "a credential(s) awarded by certification bodies—typically nonprofit organizations, professional associations, industry/trade organizations, or businesses—based on an individual demonstrating, through an examination process, that she or he has acquired the knowledge, skills, and abilities required to perform a specific occupation or job" (Workcred, 2020, p. 4). Certifications may be labeled as industry or professional, depending on the certification body. Some certification(s) serve as recognition of learning issued specifically by a profession or industry, allowing policymakers and stakeholders to discern academic certificates for completing programs and certifications issued by professions and industries.

Certificates are a document serving as evidence that an individual has completed an educational course issued by an institution or authorized vendor (Hunsinger & Smith, 2009). Certificates attest to academic, professional, or industrial attainments (Kato et al., 2020). But they are "credentials awarded by an education institution or other organization based on completion of all requirements for a program of study, including coursework and tests" (Workcred, 2020, p. 4).

Licenses are "credentials that permit the holder to practice in a specified field" (Leventoff, 2018, p. 2). Governments award a license based on predetermined criteria, such as degree attainment, certifications, certificates, assessment, apprenticeship, or work experience (Leventoff, 2018). Each state requires people hoping to join specific professions and vocations to obtain an occupational license from a state licensing board. The National Conference of State Legislatures (NCSL) states that "when implemented properly, occupational licensing can help protect the health and safety of consumers by requiring practitioners to undergo a designated amount of training and education in their field." (National Conference of State Legislatures [NCSL], 2017a, 2017b). The number of jobs requiring a license increased from 5% to 25% over the past 60 years (NCSL, 2019).

Accreditation is a review of the quality of educational institutions and programs (Council for Higher Education Accreditation [CHEA], 2020) by prominent institutional accrediting organizations. In the United States, the accreditors are private and nongovernmental organizations specifically created to review education institutions and programs' quality (CHEA, 2020). In Latin America, the accreditors for education institutions include autonomous national agencies, created legislatively and supported by public funds (e.g., Colombia, Chile, Ecuador, Peru, and Uruguay), government or Ministries of Education (e.g., Argentina, Bolivia, Brazil, Colombia, and Mexico), and university consortiums (e.g., Bolivia, Costa Rica, and Panama; they use self-study, external evaluation, and student learning evaluation (Anderson & Lemaitre, 2010).

Accreditation can also be applied to certification bodies. In the United States, organizations are accredited against standards which outline best practices for the governance of a certification body, as well as the development and maintenance of a certification assessment. Similar to higher education, certification body accreditors are private, nongovernmental organizations.

The term "credentials" encompasses academic and alternative credentials. This paper focuses on alternative or non-degreecredentials.

Academic degrees are diplomas, usually awarded by a college, university, or other postsecondary educational institution in recognition of the recipient having either satisfactorily completed a prescribed course of study or conducted a scholarly endeavor deemed worthy of the degree (Klasik, 2012). Primary-degree levels include associate's, bachelor's, master's, doctoral, and specific professional degrees (such as M.D. [doctor of medicine] and J.D. [Juris doctor of law]) (Credential Engine, 2021).

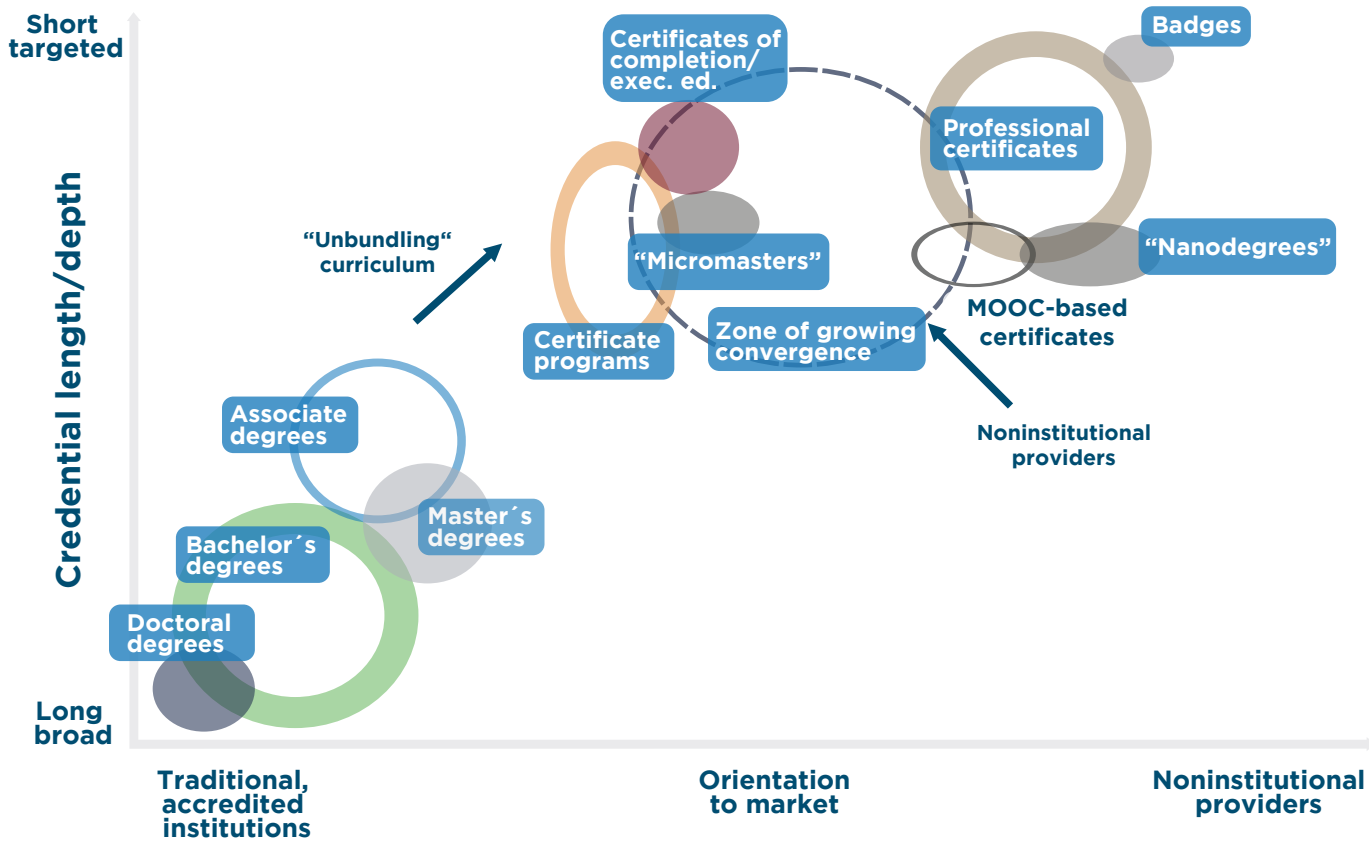
Alternative credentials. Alternative or non-degree credentials are credentials not recognized as "standalone formal educational qualifications by relevant national education authorities" (Kato et al., 2020). These alternative, alternative credentials can include certificates of completion of course completion, certificates of completion of occupation-focused training, and certifications of skills based on an exam.

Alternative or non-degree credentials come in various categories. Researchers use various definitions and categories of certification (Brown & Kurzweil, 2017; NCRN, 2019; Kato et al., 2020). In the next section, we will examine several certifying mechanisms.

2.2. Types of alternative credentials

Many credentials are awarded outside formal education and training systems (see Figure 2.2). We attempt to classify the different credential alternatives to traditional degrees that we can find in the market today by focusing on their purpose: knowledge acquired on a subject after course completion (certificate of course completion, focused on content); skills developed after training completion (certificate of training completion, a mix of content and practice and very connected to specific occupations); and results of a third-party validated test or an exam (certifications, no content or practice is provided, just the test).

Figure 2.2.
Credentials by length and accreditation



Source: Adapted from Gallagher, 2018.

We review the types of alternative or non-degree credentials below. While they can overlap, these credentials generally include course and training certificates in addition to assessment-based certifications (see Table 1).

Certificate of course completion

Massive open online courses (MOOC)-based certificates
Micro-credentials
Academic and continuing education certificates

Certificate of training completion

Coding Bootcamp completion certificates
Longer coding bootcamps
Apprenticeships

Certification

Industry-recognized certifications

Table 2.1.
Types of alternative credentials

Certificate of Course Completion			Certificate of Training Completion		Certification
Massive open online courses (MOOC)-based certificates	**Micro-credentials**	**Academic and continuing education certificates**	**Coding Bootcamp completion certificates**	**Apprenticeships**	**Industry-recognized certifications**
Short, mostly asynchronous, online courses No formal evaluation; Sometimes, assessment included	More than a single course but are less than a full degree Modularity and stackability in few cases	For-credit (academic certificate) or non-credit (continuing education certificate) Run by various institutions, often the higher education's continuing education	Full-time or part-time intensive coding training programs Mostly online after COVID Income Share Agreement & Deferred Tuition in some cases	Blended work experience with a structured program of coursework Certificates of completion with performance evaluations	Awarded by as an industry or professional association Often, time-limited, renewable Based on performance on an assessment (e.g., oral, written, or performance-based test)
LinkedIn Learning edX Coursera OpenClassrooms SkillShare PlauralSight	Udacity nanodegrees edX MicroBachelors edX MicroMasters Coursera MasterTrack Coursera Specialization	TVET certificate Short-cycle higher education program University and College Course Certificates eCornell	General Assembly Le Wagon Thinkful Holberton	IBM Lockheed Martin U.S. Department of Labor registered apprenticeship programs	Amazon Web Services (AWS), Google Computing Technology Industry Association (CompTIA) Automotive Service Excellence (ASE) American Welding Society (AWS)
1-10+ hours	100 hours to 1 year	100 hours to 4 years	6 to 28 weeks Longer bootcamps: 9 to 24 months	6 weeks to 6 years	The time to earn a certification is based on the prerequisites required to sit for the exam, which can vary from no prerequisites to a graduate degree.
Free to $300	$30 – $12,000	$7,000 – $20,000	$5,000 to $15,000 Longer bootcamps: $30,000 to $85,000 (Income Share Agreement & Deferred Tuition available)	N/A	Free to $1,400

Additionally, these credentials may take different forms depending on seven dimensions:

1. Types of skills that are measured or assessed (traditional vs. new skills).
2. Duration/time investment required (short vs long).
3. Type of provider (formal providers vs new providers).
4. The market value of the accreditation (high recognition/trust vs low recognition).
5. Level of involvement with the industry (highly connected/relevant vs low connected).
6. Social capital value (high networking vs low network).
7. Connectivity (stackability of alternative credentials—can credentials be combined? Are they linked to other learning experiences? How connected are credentials with each other? Is a credential a building block that can be used to acquire new credentials?).

On a side note, individuals may obtain a digital badge after earning a certificate or a certification. In this case, digital badges signify possession of other credentials, showcasing an individual's alternative credential, rather than a separate credential (NCRN, 2019). Digital badges may also be pictograms or logos flagging specific skills and knowledge, backed by links to the electronic evidence of how and why, and exactly, the badge was earned (SURFnet, 2016; Carey, 2015).

Certificates of course completion

Certificates of course completion attest to an individual's completion of course requirements. This type of certificate includes academic and continuing-education certificates, micro-credentials, and massive open online courses (MOOC)-based certificates. Course certificates can cover all traditional and new skills, such as business, technology, science, and art. They usually take one to nine months to earn. Providers include universities, companies, and public organizations. Still, the market value of a certificate is not clear. The level of industry involvement can vary, as some are developed in partnership with industry organizations. Most certificates offer few networking opportunities, particularly if earned online, and may result in minimal social capital for their holders (e.g., online bulletin board). Some of these course certificates can be stacked and counted toward college credit, but most of them do not have stackability. The price can vary from free to $20,000.

Massive open online courses (MOOC)-based certificates. MOOC-based certificates offer evidence of specialized skills gained through completing a collection of courses. Many MOOC-based certificates are micro-credentials. Conceptually, they are not markedly different from classic non-credit certificates offered by universities, except for the following:

1. MOOC providers award them in affiliation with, rather than by, the university;

2. MOOC-based certificates are shorter and less expensive than a traditional certificate;

3. Many MOOC-based certificates are designed in partnership with industry-leading firms and include work-related capstone projects (Gallagher, 2016).

Micro-credentials. Micro-credentials are online educational certificates covering more than a single course but less than a full degree (Pickard, 2018; Shah, 2018). Each MOOC platform uses unique labels for the micro-credentials it offers (Credential Engine, 2021). Micro-credentials can be a part of a trend toward modularity and stackability in tertiary education—the idea being that each little piece of education can be consumed on its own or can be aggregated with other parts into something larger. Each course consists of units, and each unit has lessons. Courses can stack up to Specializations or Xseries and stack up to partial degrees, such as edX's MicroMasters or Udacity's Nanodegree programs, or to full degrees. However, only some micro-credentials are structured as building blocks toward degrees (Pickard, 2018). Micro-credentials are structured to be completed in less than a year, usually around six months, and cost only a few hundred to a few thousand dollars. Most cover work-related subjects, such as business and computer science. Udacity has a trademark for Nanodegree, and edX has a trademark for MicroMasters, perhaps in order to define their quality by market reputation, rather than traditional regulation or accreditors (Young, 2016).

Academic and continuing education certificates. Academic and continuing education certificates are recognition of meeting the learning objectives and satisfactory completion of a alternative program of study, often through a university's continuing education or extension services (Carnevale et al., 2012; Credential Engine, 2021). A certificate may be for-credit (academic certificate) or non-credit (continuing-education certificate). These certificates from institutions are earned through seat time in a classroom, mainly at public two-year schools, or through private for-profit alternative-granting business, vocational, technical, and trade schools. Some tertiary institutions also offer practical, labor market–oriented short-cycle programs (SCPs) (Ferreyra et al., 2021). While individuals can complete most certificates with one year of full-time academic effort, certificates are classified by the time allotted to program completion: a two-year degree, typically for students enrolled full-time. Short-term certificates can be completed in less than a year, medium-term certificates take up to two years, and long-term certificates take between two and four years.

Certificates of training completion

Certificates of training completion indicate that individuals have completed occupation-focused training. Such certificates for occupation-focused training include apprenticeships, coding bootcamp completion certificates, and longer coding bootcamps. Training certificates focus on professional skills, such as cloud computing. The duration can vary depending on the type of training. Some apprenticeships are relatively short, such as six weeks to 12 months, but other apprenticeships can last four to six years (Torpey, 2019). Bootcamps take 14 weeks on average. However, longer types of bootcamps, such as Holberton, can take up to nine months to two years. Apprenticeships are typically offered by companies or labor-management organizations, while bootcamp providers are new.

The value of training certificates seems high. One report found that coding bootcamps offered "competitive employment results to computer science degrees from top universities – at around 10% of the cost" (Rhee, 2021). For example, 83% of bootcamp alumni report being employed in a programming job, and graduates report an average starting salary of $67,000. Companies directly recruit the workforce through apprenticeships. Since the companies and industry professionals design the courses, they are highly connected to the industries. Yet, they have only moderate social capital value, as they offer networking opportunities with cohorts or others, but not many. Training certificates are usually standalone credentials, but can sometimes count toward degrees. The average cost of a coding bootcamp can vary from $5,000 to $15,000. For longer coding bootcamp programs, the cost can be as high as $30,000 to $85,000. Conversely, apprentices are paid hourly. But coding bootcamp students can pay off their tuition once they get their high-paying jobs. They can also avoid paying tuition upfront through deferred tuition and income-share agreement options.

Coding bootcamp completion certificates (with income-share agreement [ISA] and deferred tuition). Coding bootcamps are "intensive, accelerated learning programs that teach beginners digital skills," such as full-stack web development, data science, and digital marketing (Course Report, 2020). On average, bootcamps cost around $13,500, and graduates report an average starting salary of $67,000. Bootcamps run from 6 to 28 weeks, with the average at around 14 weeks. Coding bootcamps aim to improve job opportunities for coders by reducing the length and cost of training compared to universities, tweaking curricula in response to technological changes and employer demand, and meeting employer needs for skilled coders (Stewart, 2020). Coding bootcamps provide instruction in-person, online, or both. While most are located in one country, several offer courses in multiple nations. Coding bootcamps issue certificates of course completion; they often provide ISAs and deferred tuition, where students pay a fixed monthly amount once they graduate and find a job.

Longer coding bootcamp completion certificates (with ISAs and deferred tuition) (Holberton School, 42). While most bootcamps are 12 to 14 weeks long, some programs provide much longer training of 24 to 36 months, through intensive course curricula designed with industry professionals. Graduates of these longer bootcamps earn a higher average post-completion salary. The average wage for those completing an eight-week bootcamp was $58,248, the average salary for bootcamps of 16+ weeks was $71,103 (Course Report, 2020). Some bootcamps (e.g., 42) have free tuitions. Like other bootcamps with ISAs and deferred tuition, students can pay back tuition cost with 17% of their salary over two to three years once they get a job. While some programs offer direct instruction from professionals, others do not have teachers or instructors; students teach and support each other. These programs

also help them improve their portfolio, online presence, interview skills, and negotiation skills for employment.

Apprenticeship certificates. Apprenticeships are formal study programs that blend work experience with a structured coursework. Apprenticeships offer "hands-on training, technical instruction, and a paycheck all at the same time" (Torpey, 2019). In countries with well-developed apprenticeship systems like the United States and Germany, apprenticeships are typically regulated by the state (e.g., U.S. Department of Labor Registered Apprenticeship) and must meet national standards (NCRN, 2019; Workcred, 2020).

In the United States, apprenticeship certificates are "credentials earned through work-based learning and postsecondary earn-and-learn models," applicable to industry trades and professions (Leventoff, 2018, p. 2; Workcred, 2020). These apprenticeship programs provide certificates of completion when participants complete the requirements. Registered apprenticeship programs have five elements: a paid job, work-based learning, classroom instruction, mentoring, and a nationally recognized credential.

In Latin America and the Caribbean, some countries, such as Brazil, Chile, Colombia, Costa Rica, Mexico, and Peru, have actively implemented or redesigned the national apprenticeship programs (Fazio et al., 2016). Most of them have both on-the-job and off-the-job training. Still, most countries lack assessments and resulting certificates of skills, which are widely recognized by employers (see Table 2.2).

Table 2.2.
Apprenticeships in Latin America and the Caribbean

Country	A job (contract/ agreement between employer and apprentice)	Structured training (defined training plan)	On-the-job + off-the-job training	Assessment and industry-recognized certificates of acquired skills
Brazil	O	O	O	X
Chile	O	O	X	X
Colombia	O	X	O	X
Costa Rica	X	X	O	X
Mexico	X	O	O	O
Peru	Sometimes	O	O	O

Source: Fazio et al. (2016)

IBM offers a 12- to 18-month apprenticeship for software engineers, cybersecurity professionals, and designers (Fain, 2019). These apprenticeships include 200 to 300 hours of learning, instruction, and on-the-job experience. By 2019, more than 400 people had participated in these apprenticeships; 96% of them were hired into full-time positions. IBM also created a partnership with the Consumer Technology Association (CTA) to create the CTA Apprenticeship Coalition to share apprenticeship experiences with other companies. Upon completion, apprentices receive a certificate of apprenticeship from the U.S. Department of Labor, in addition to IBM digital badges or credentials.

Certification of skills after passing an assessment

Certification, a type of industry-recognized credential, is separate from education and training. Certification indicates that individuals have adequate knowledge and can competently perform tasks based on an assessment. Professional organizations or companies grant individuals certifications after they pass an assessment, which may be oral, written, or performance based. Certifications are time-limited, renewable credentials awarded by an authoritative body, such as an industry or professional association. They are based on performance on a test, irrespective of where they occur, for designated knowledge, skills, and abilities in a particular occupation (Carnevale et al., 2012). Certifications mostly focus on digital or professional skills related to an occupation, although they can be applied to other skills. Examinations usually take a few hours, but preparation for the exam depends on the prerequisites required. Some certifications have no prerequisites, while others may require a bachelor's or graduate degree. Companies, such as Google, Amazon, or IBM, or industry associations like the Computing Technology Industry Association (CompTIA) or American Welding Society, offer certifications. These certifications have high market value, as they can be used for recruitment or promotion. Forty-five percent of entry-level postings for relevant occupations mention Automotive Service Excellence (ASE) or American Welding Society certifications. The level of involvement with the industry is high, because companies and industry professionals are rigorously engaged in developing and validating the competencies assessed in the certifications.

Another example is the Project Management Institute's Project Management Professional (PMP) certificate, which is held by more than one million people. To help people prepare for the certification exam, PMI provides a list of authorized training providers through which individuals can enroll in exam preparation courses. The organizations that provide the exam preparation materials and courses and those that develop and design the certifications are usually not the same. In addition, there are test administrating organizations. Two major certification test administrators are Prometric and Pearson VUE. There is low social capital value, as they do not offer many networking opportunities. Certifications are offered at multiple career points, and individuals can progress from one certification to the next. Certification exams costs can vary from free to $1,400. In addition, the cost exam preparation materials can range from hundreds to thousands of dollars.

Part 3:

Degrees and Alternative Credentials as Parts of the Solution

Part 3:
Degrees and Alternative Credentials as Parts of the Solution

In this section, we will examine degrees and alternatives as a part of the solution. First, we will review similarities and differences between degrees and skill-based alternative credentials. Then, we will look into what occupations are more open to alternative alternative credentials.

3.1. Similarities between degrees and alternative credentials

Both academic degrees and alternative credentials perform the same functions (Bills, 2003; NCRN, 2019). First, both provide individuals an opportunity to nurture marketable skills and abilities and increase human capital. Both help job candidates and employers communicate specific job-related skills and productivity. Employers use these alternative credentials to screen and filter potential employees. Lastly, both can be used as a mental shortcut and may be valued much more than the actual skills and abilities (see Table 3.1). Each of these features is explored below.

Table 3.1.
Similarities between degrees and alternative credentials

What do degrees and alternative credentials do?
Increase human capital
Communicate specific technical abilities and productivity
Serve to screen and filter potential employees
Communicate cultural, social, and interpersonal dispositions
Provide signals to employers (beyond actual skills and learning)

Increase human capital

We learn knowledge and skills in classes. Schooling and training provide marketable skills and abilities relevant to job performance. Learners and students invest their time and money into their education that should provide future returns. Skills acquired in schools, especially early human development stages, seem general and transferable across employers, while specific skills are developed in the workplace (Becker, 1964; Schultz, 1962).

Communicate specific technical abilities and productivity

Job candidates and employers use education credentials to communicate and signal specific technical abilities and productivity (Bills, 2003; NCRN, 2019). Degrees and alternative credentials are used to signal candidates' particular technical skills, knowledge, and productivity.

Serve to screen and filter potential employees

Employers use education credentials to screen and filter job candidates (Bills, 2003). Education and training serve as a screening device to sort through individuals of differing abilities, conveying information to labor purchasers (Arrow, 1973). By way of illustration, a study on how hiring managers use credentials shows that certificates can be used to differentiate job candidates and improve the hiring process (Bartlett et al., 2005). The majority of employers in the manufacturing industry also report that alternative credentials were useful when selecting job candidates, while large organizations prefer workers with credentials (Workcred, 2018).

Communicate cultural, social, and interpersonal dispositions

Individuals learn skills, norms, and protocols in schools, but they also self-select education levels and options. Degrees and alternative credentials can communicate individuals' cultural, social, and interpersonal characteristics. Such characteristics could include soft skills from training, as well as cultural, social, and interpersonal characteristics of individuals who choose to earn education credentials. The cultural resources available to workers with educational attainment can be either enabling or constraining. More highly schooled people may have social and interpersonal tendencies that employers value (Bills, 2003; Walsh, 2020).

Provide signals to employers (beyond actual skills and learning)

Some people argue that degrees matter more than the skills and understanding people obtain from schools. Degrees can work as a proxy for employers and an excuse if hiring does not work out (Goldberg, 2020). In Spence's job market signaling model, potential employees send signals about their skills and capabilities through education credentials (Spence, 1973). Education's effect on earnings is not linear, and degrees provide a considerable boost to one's earnings—more than a single year of schooling. (People called it the "sheepskin effect," as degrees were printed on sheepskin in the early days) (Belman & Heywood, 1991). A study on postsecondary education in Colombia found that returns to college reputation are as high as the returns to skills (Busso et al., 2020). Some alternative credentials, such as licenses, may communicate non-felony status, which can be valuable for disadvantaged candidates in the labor market (Blair & Chung, 2018).

3.2. Differences between degrees and alternative credentials

Alternative credentials can offer individuals much shorter, more affordable and to-the-point, versatile solutions than academic degrees. In this section, we dissect the differences between degrees and alternative credentials. Specifically, we will investigate the differences by duration to complete, types of skills, expiration, ways of validation, delivery mode and platforms, providers, costs, market value and recognition, social capital value and networking opportunities, employers' perception and premium, the number of credentials that individuals can pursue, and the level of involvement with the industry (see Table 3.2).

Table 3.2.
Difference between degrees and alternative credentials

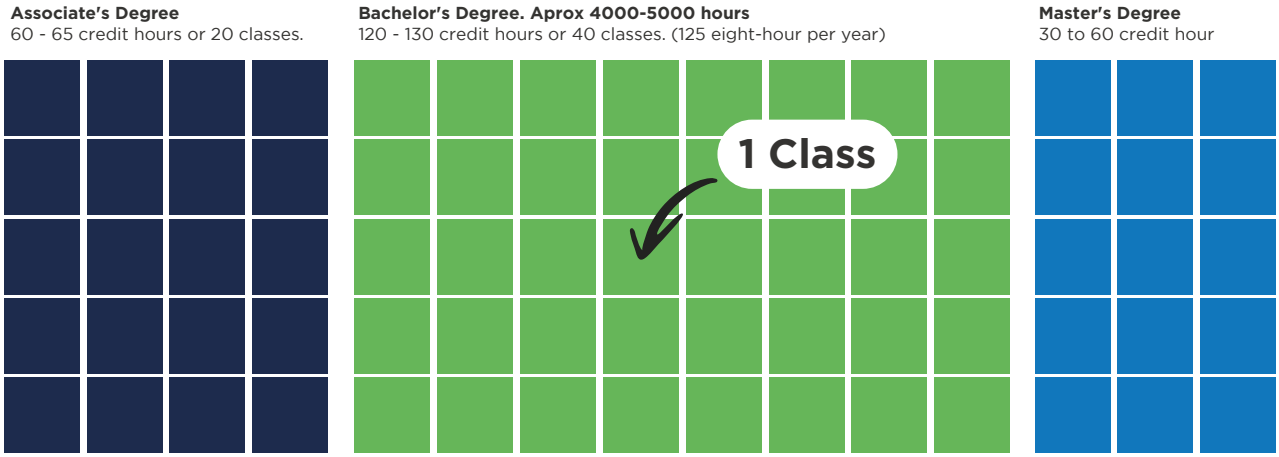
	Traditional university degrees	Alternative credentials
Duration to complete	At least 2 to 6 years for bachelor's degrees	Varies from hours to years Coding bootcamps take 14 weeks on average. Udacity nanodegrees, Crehana MicroDegrees, edX MicroBachelors, and edX MicroMasters can take four to nine months. The time to earn a certification is based on the prerequisites required to sit for the exam, which can vary from no prerequisites to a graduate degree
Types of skills	Major and multiple electives;	For-credit (academic certificate) or non-credit (continuing education certificate) Run by various institutions, often the higher education's continuing education
Expiration	No expiration	Certifications (e.g., by professional association or industry brand) often have an expiration date and usually require renewal or recertification after a specific period of time. Certificates for completing course content or occupation-focused training do not expire.
Ways of validation – course, training, and exam credentials	Attendance, assignments, examinations, GPA, and credit hours	Certificates for course completion and training use attendance, assignments, and examinations.
Delivery mode and platforms	Mainly face-to-face (pre-COVID), moving to online and hybrid	Face-to-face, online, hybrid,
Providers	Accredited and unaccredited tertiary institutions	Various organizations (e.g., online platform companies, universities, private education institutions, businesses and companies, industry and professional organizations, museums, nonprofits, local governments, and non-governmental organizations)
Costs	More than $40,000 to $150,000 for traditional bachelor's degrees. In Latin America, traditional bachelor's degrees can cost up to about US$ 5,500. About $6,600 to $22,000 for online bachelor's and Master's degrees. Student aid (e.g., financial aid, grants, loans, tax credits, work-study) is available.	Certificates for completing courses cost $0 to $5,000. Certificates for occupation-focused training cost from zero to $50 per month to $85,000—with an option to learn first and pay the tuition back after graduation. $100" to "free.

Market value and recognition	The median income earnings of full-time working bachelor's degree holders with no additional degrees were $24,900 higher than high school graduates' income. The ROI of a bachelor's degree was estimated to be $306,000, and $129,000 with the risk of dropping out. Bachelor's degree holder-led families have more than 100% higher median income than families led by no-degree holders. However, the premium dramatically decreased. Also, degrees' values depend on the major. Some degrees are worth millions of dollars lifetime earnings, while other degrees have negative ROI and can harm students financially.	The value of alternative credentials varies substantially across occupations, industries, states, and regions. Certificates of course completion, with credits, such as sub-baccalaureate certificates from community colleges, also increase individuals' earnings, on average 20%, and increased employability. Coding bootcamps certificates can have similar earning potentials compared to Computer Science Bachelor's degree holders. Certifications show as much as an 18% salary premium for entry levels and 50% for mid-career levels in industries that value certification.
Social capital value and networking opportunities	Degrees offer extracurricular opportunities, friendships, and access to social networks, including alumni	Given its focused content area and limited time, alternative credentials may offer fewer social networking possibilities
Employers' perception and premium	Degrees have served as an established proxy for employers	Employers report that they expect, consider, and prefer candidates with certificates and certifications when hiring
The numbers of credentials that individuals can pursue	Small	Large
Level of involvement with the industry	Low	High

Duration to complete

Degrees take at least three years to complete (see Figure 3.1). Bachelor's degrees take three to six years. Master's degrees take an additional one to two years. Doctoral degrees take an additional three to six years. Students may need more time to complete their degrees. For instance, only 28% of students at two-year public institutions received a degree or certificate within 150% of the expected time for completion (National Center for Education Statistics, 2016).

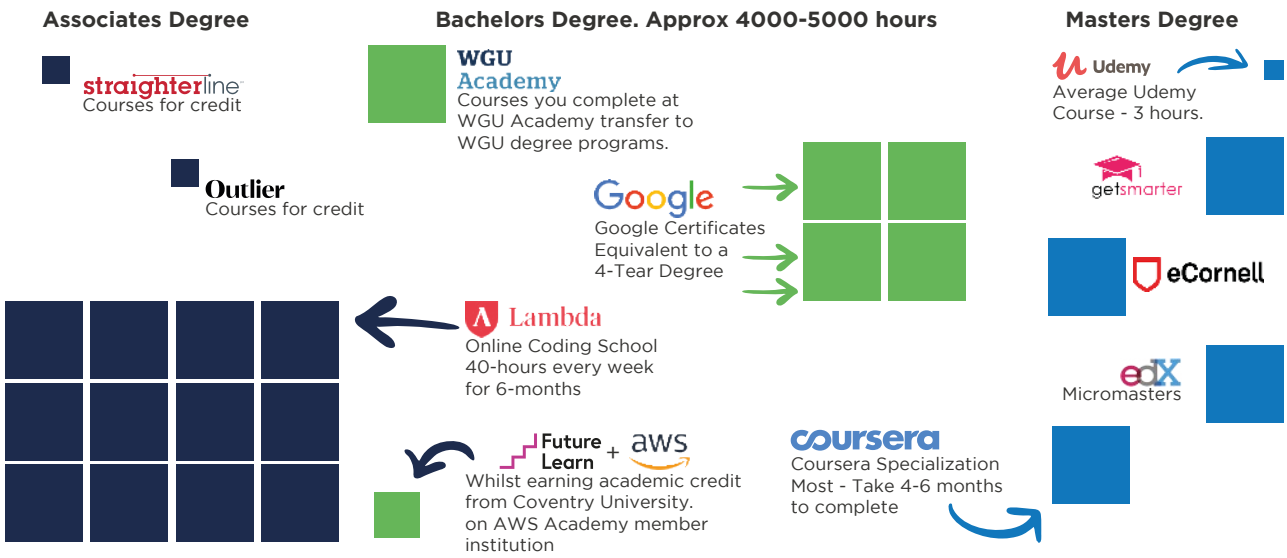
Figure 3.1.
Credit hours and classes for degrees
Degrees could be considered as "Bundles" of carefully selected, sequenced, and integrated curriculum.



Source: HolonIQ, 2021.

Conversely, alternative credentials can be completed in hours, days, weeks, and months (see Figure 3.2). Certificates are flexible and frequently self-pacing. Udacity nanodegrees, Crehana MicroDegrees, edX MicroBachelors, and edX MicroMasters can take four to nine months to complete. Occupation-focused training certificates also help individuals prepare for the job market more quickly than degrees. For instance, some apprenticeships are relatively short, such as six weeks to twelve months, but other apprenticeships can last four to six years (Torpey, 2019). Coding bootcamps take fourteen weeks on average, while the longer coding bootcamps can take up to two years. And the Google Career Certificate for IT support professionals can take up to eight months.

Figure 3.2.
Credit hours and classes for alternative credentials
"Alternative" credentials are evolving pathways, substitutes, and alternatives for learners.



Source: HolonIQ, 2021.

Types of skills

Degree programs require students to master basic content and foundational concepts—the hows and whys. Many undergraduate students take more than a hundred credit hours before graduating. Students cover a lot of content across different disciplines within the field in addition to taking elective courses to meet graduation requirements.

The degree curriculum for an academic major provides a general foundation beyond the skills required for occupations. Computer Science degree programs cover a deep understanding of systems, general foundations (the hows and whys), beyond the coding languages and tools to build websites or mobile apps. Degree programs, in particular a bachelor's degree, have defined and fixed curricula, which need to be approved by accrediting entities.

By way of contrast, alternative credentials tend to focus on targeted, often applied, content. They may be provided by colleges and universities, corporations, museums, and other organizations. Most important, students choose what knowledge and skills they want to acquire without being required to take general electives. Some occupation-focused training programs highlight applied learning. Most coding bootcamps focus on coding language and tools for developers and may or may not delve into the hows and whys seen in traditional computer science degrees (Eggleston et al., 2016; Williams, 2020).

A gap that degrees and alternative credentials do not fill is credentials in soft skills. Professional certifications mostly focus on hard rather than soft skills (Markow et al., 2017). One possible reason for this could be that education systems, regardless of degrees and alternative credentials, may not place a particular focus on soft skills. Another reason could be that it is difficult to find a clear, objective way to evaluate soft skills. Yet employers struggle to find job candidates with adequate soft skills (Adobe, 2019; Levy & Cannon, 2016) and then to accurately assess these skills (LinkedIn, 2019), which become more important with the rise of automation (Deming, 2017; LinkedIn, 2019). Certificates or certifications focusing soft skills are rare. Among the top 200 most-demanded certifications in job postings, only ACT's WorkKeys National Career Readiness Certification (NCRC) focuses on soft skills (2020b). Moreover, the NCRC credentials had less than 2% of market adoption of the most common certifications (Markow et al., 2017) perhaps because "there is no common agreement on how to define or measure them or because such skills are best assessed within the context of a particular occupation rather than in isolation" (Markow et al., 2017, p. 3).

Expiration

Degrees do not expire. Similarly, alternative credentials for completing the content and occupation-focused training (e.g., certificates) do not expire. Many certifications do expire, and individuals need to renew them regularly as evidence that their skills are current. Amazon Web Services and CompTIA certifications require renewal every three years, while Google Cloud certifications are valid for two years. Holders of these certifications must recertify to maintain their certification status.

Ways of validation: Courses, training, and assessment

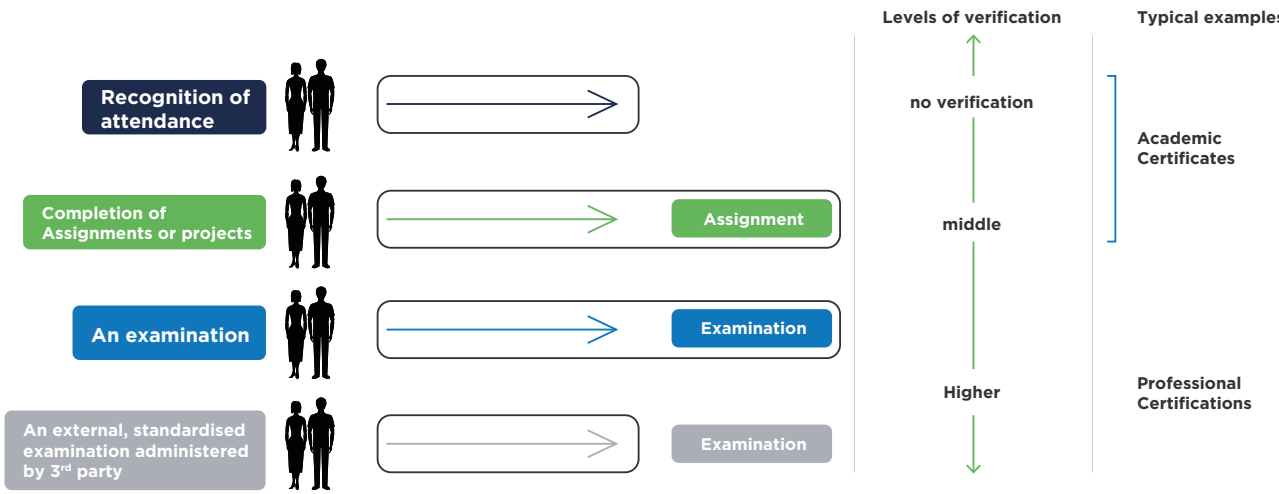
Accredited schools provide strong credentials for academic degrees, and these programs are regulated. Students need to complete a certain number of credit hours while remaining in good standing (i.e., grade point average [GPA]). Schools validate the progress with a combination of attendance, assignments (formative and/or summative), examinations, and credit hours.

Certificates of course completion also use the combination of attendance, assignments, projects, and examinations to validate students' progress. In some edX MicroMasters programs, students need to pass the course delivered on edX through attendance, quizzes, and assignments, and the proctored exam.

Certificates for completing occupation-focused training programs validate the students' progress through attendance, assignments, and exams or job performance. Coding bootcamps or other certificate programs from degree-granting institutions use attendance, assignments, and exams to validate students' progress. Conversely, apprenticeship programs evaluate the participants' performance. At Lockheed Martin, participants are assessed by their daily performance, and the hiring managers provide weekly feedback (Lockheed Martin, n.d.).

Finally, certifications use an external, standardized, and third-party-administered and proctored examination or assessment. Students need to go to testing centers or take exams online in a monitored environment (see Figure 3.3).

Figure 3.3.
Types of validation



Source: Kato et al., 2020.

Delivery mode and platforms

Most degree programs traditionally offer face-to-face instruction. But the pandemic has shifted universities to online and hybrid platforms. In Latin America and the Caribbean, 90% of tertiary institutions rate digital and online learning as "very important" to their future, yet only 63% of institutions claim they are digitally mature (Inter-American Development Bank et al., 2022). Digital adoption and transformation remain the top priority and key challenge, particularly in teacher training and development, and technology solution access (Inter-American Development Bank et al., 2022). On the other hand, alternative credential programs have always been more flexible than degree programs. Many of the courses and exams, such as PearsonVUE and PSI, are offered through online and hybrid platforms, such as edX and Coursera, and testing centers.

Providers

Degrees are provided by accredited academic institutions, whereas alternative credentials programs are offered at a range of organizations, including online platform companies, public and private academic institutions, businesses and companies, industry and professional organizations, museums, nonprofits, local governments, and non-governmental organizations (Maxwell, 2017). Coursera's most popular courses in 2019 included Machine Learning (Stanford University), The Science of Well-Being (Yale University), AI for Everyone (deeplearning.ai), and What is Data Science? (IBM) (Coursera, 2019). EdX's most popular courses include CS50's Introduction to Computer Science (Harvard), Introduction to Python (Microsoft), TOEFL Test Preparation (ETS), and Introduction to Linux (Linux Foundation) (Shah, 2019). Moreover, Inter-American Development Bank (IDB), Boston Consulting Group (BCG), Google, the Museum of Modern Art (MoMA), American Museum of History, the UN Sustainable Development Solutions Network's SDGAcademy, World Bank Group, and the International Monetary Fund (IMF) also provide edX and Coursera learning opportunities.

Costs

The cost of earning a bachelor's degree ranges from $40,000 to $150,000. On average, U.S. private four-year colleges cost around $38,070 per year, whereas U.S. public four-year colleges cost $10,740 per year for in-state students and $27,560 a year for out-of-state students (College Board, 2021). Conversely, U.S. public two-year colleges can cost around $3,730 per year. For degrees, students can receive financial aid such as grants, loans, tax credits, or work-study programs (College Board, 2021).

In Latin America, annual tuition ranges from US$1,243 for universities and US$2,694 for four-year professional institutes in Peru to US$5,423 for five-year universities in Chile (Espinoza and Urzúa, 2016). Some countries in Latin America and Europe offer free tuition to students. In these cases, it is taxpayers who finance tuition (Ferreyra et al., 2017). Formal education and training systems are also rigid, with many failing to teach their students the skills they need to succeed in the workplace.

An increasing number of schools have started to offer online bachelor's and master's degrees at much lower prices, costing $6,600 to $22,000. The Coursera bachelor's degree program at the University of North Texas costs $330 per credit, totaling up to $14,850. Georgia Tech's online master's in computer science costs around $6,600 for the full degree. The University of Illinois has an online M.B.A. for under $22,000. Coursera's online master's programs cost around $22,000.

Certificates for course completion can be much less expensive than the traditional and online degrees, costing $0 to $5,000. Many MOOCs offer certificates for free. Some stackable programs are also much less expensive. EdX MicroBachelors programs cost around $166 per credit, totaling up to $500 to $1,500. Conversely, the EdX MicroMasters costs $962 on average. Coursera's MasterTrack certificates cost around $2,596.

Certificates for completing occupation-focused training are also much less expensive than the traditional and online degrees, costing $49 per month to $13,500. Some even offer an option to learn first and pay the tuition back after graduation. Google Career Certificates for IT Support Professionals cost $49 per month. Costs of coding bootcamps can ranges from below $5,000 to over $15,000. Through deferred tuition and ISAs, some coding bootcamps also offer the opportunity to pay back once students graduate and get high-income jobs. Conversely, apprenticeships provide individuals an hourly rate.

Certifications cost around free to $1,400, depending on the skills and occupation. Specifically, most industry-recognized certifications in the IT industry cost around $123 to 349 (CompTIA), $150 to 300 (Amazon Web Service), and $120 (Google). Conversely, the Certified Financial Analyst (CFA) costs around $700 to $1,400, depending on when an individual registers for the exam.

Market value and recognition

Degrees may seem to generate better labor market and income outcomes, yet premiums have been declining. The college income premium is "the extra income earned by a family whose head of household has a college degree over the income earned by an otherwise similar family whose head of household does not have a college degree" (Emmons et al., 2019, p. 297). The median income earnings of full-time working bachelor's degree holders with no additional degrees were $24,900 higher than high school graduates' incomes (College Board, 2019). However, a recent study found that it is misleading to read the numbers at face value that bachelor's degree holder-led families have more than 100% higher median income than families led by no-degree holders (Emmons et al., 2019). A close examination found that "the wealth-building advantage of higher education has declined among recent graduates of all demographic groups. Among all racial and ethnic groups born in the 1980s, only the wealth premium for white four-year college graduates remains statistically significant" (p. 299). The wealth premium is significantly lower even for white four-year graduates than in previous generations.

Recently released university and program-level data from the U.S. Department of Education showed a more accurate picture (Copper, 2021a, 2021b; Gillen, 2021; Itzkowitz, 2021; Marcus, 2021). If students graduate on time, their bachelor's degrees have a median net ROI of $306,000, and with the risk of dropping out (with no ROI), the ROI dropped to $129,000 (Copper, 2021a, 2021b). About 65% of bachelor's degree programs left most their graduates earning enough to recover the education costs within 10 years or less, whereas 10% of the programs showed their graduates earn less than typical high school graduates (Itzkowitz, 2021).

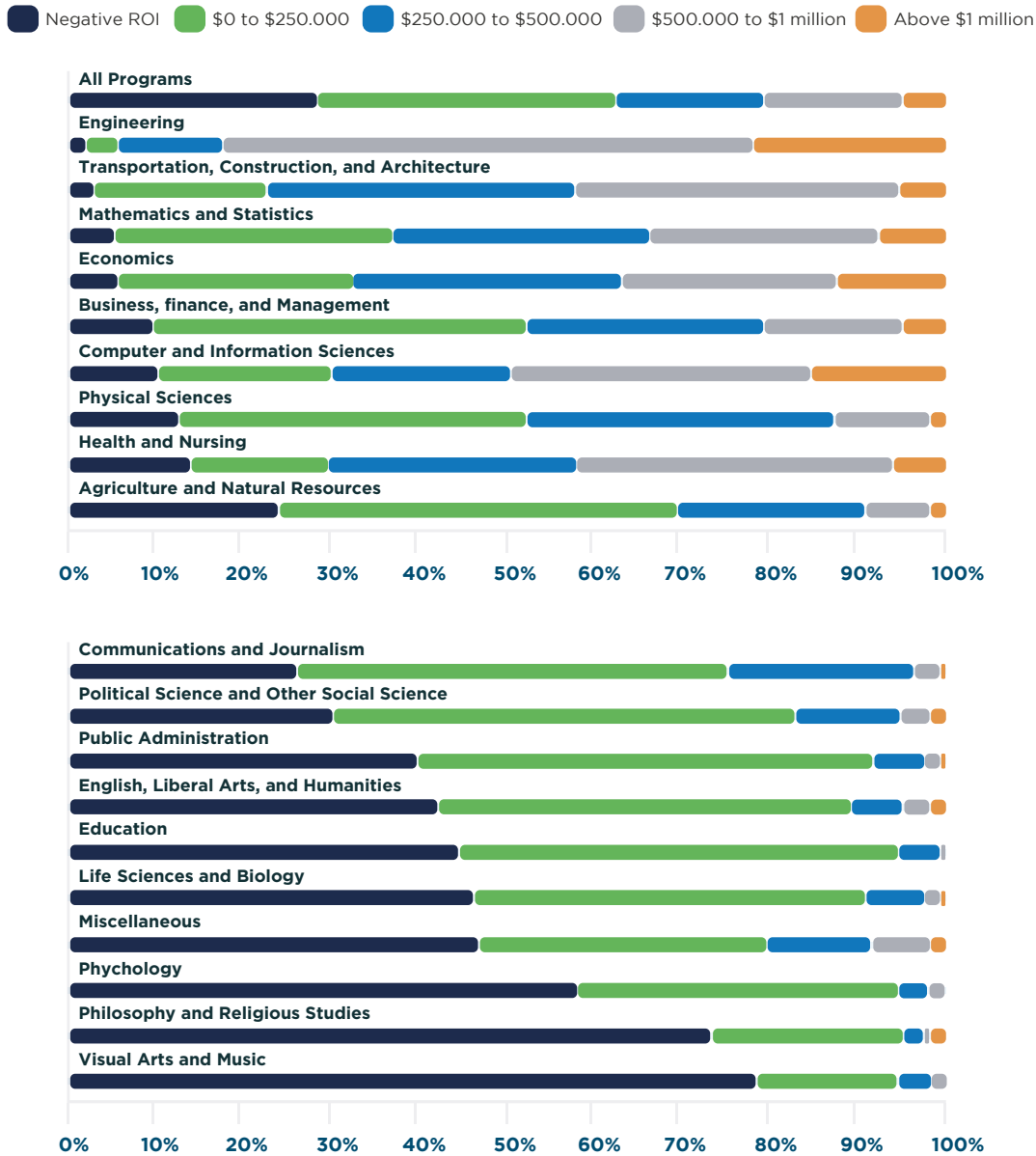
In Latin America, higher education graduates can expect to earn on average 104% higher salaries than high school graduates, if other characteristics remain constant (Ferreyra et al., 2017). College dropouts enjoy a relatively large earning premium of 35% over high school graduates, which does not incentivize students to complete their degrees (see Figure 3.4) (Ferreyra et al., 2017). Still, such Mincerian returns even compared with primary education have declined (Messina & Silva, 2017).

Figure 3.4.
Mincerian returns: a comparison of incomplete higher education versus completion (degrees) in Latin America and the Caribbean, mid-2010s

Source: Ferreyra et al., 2017.

The value of the degrees depends on the major. Some degrees are worth millions of dollars (Copper, 2021a, 2021b). In the United States, four in five engineering programs have ROI above $500,000 (Copper, 2021a, 2021b), while health, nursing, engineering, and construction management graduates could recoup their educational investment in five years or less (Itzkowitz, 2021). Conversely, 28% to 37% of university programs, mostly in philosophy, religious studies, arts, music, and psychology (Copper, 2021a, 2021b) or drama, dance, and zoology (Itzkowitz, 2021) have no net financial value; they might in fact financially harm students with negative ROI. Additionally, while elite schools dominated the highest ROI programs, some elite school degrees also have negative ROI (Copper, 2021a, 2021b) (see Figure 3.5).

Figure 3.5.
The expected financial value of college: Distribution of ROI by major category, adjusting for completion outcomes



Source: Copper (2021a, 2021b).

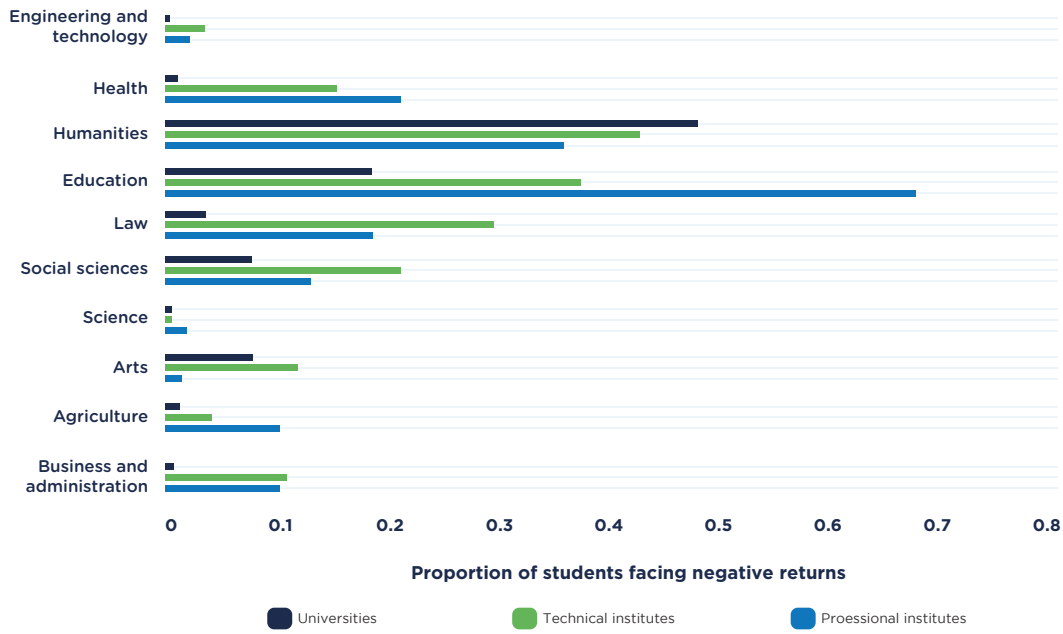
In Latin America, ROIs on these postsecondary degrees also varied by the fields of study. Chile's engineering and technology university students have the highest ROIs, followed by law, business, and science; humanities have the lowest returns, followed by education, social science, and arts (Espinoza & Urzua, 2016). Additionally, 10% of students in Chile had negative expected returns, regardless of field and type of educational institution (see Table 3.3 and Figure 3.6 below) (Espinoza & Urzua, 2016).

Table 3.3
Returns in Chile, by field of study and postsecondary institution types

	Technical training centers (two-year degrees)	Professional institutes (four-year degrees)	Universities (five-year degrees)	Overall
Agriculture	35.3	42.5	62.7	52.5
Arts	66.1	31.0	49.0	41.2
Business management	57.1	54.6	126.8	78.2
Education	-2.4	9.5	12.7	9.6
Engineering and technology	109.6	99.8	163.5	125.8
Health	40.5	40.9	101.5	73.3
Humanities	-5.2	12.1	2.3	4.1
Law	61.3	38.6	128.5	115.1
Science	97.2	15.5	115.3	113.6
Social sciences	34.5	18.7	47.0	36.6
Total	**66.2**	**58.9**	**97.5**	**78.4**

Source: Espinoza & Urzua, 2016.

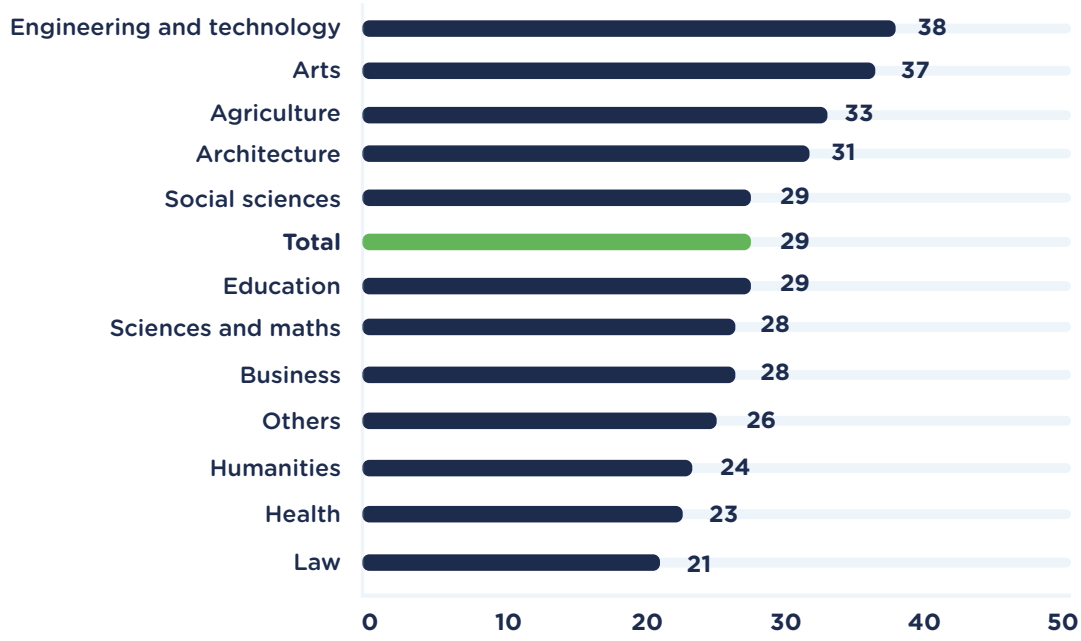
Figure 3.6.
Chile: Proportion of students facing negative expected returns in, by field and institution types



Source: Espinoza & Urzua, 2016.

Still, the caveat is that this ROI pattern may change. According to OECD's international analysis of tertiary graduates' job attributes, Avvisati et al. (2013) found that arts graduates, along with engineering and computing graduates, are most likely to hold a highly innovative job where they contribute to product innovation (see Figure 3.7).

Figure 3.7.
Percentage share of graduates having a highly innovative job

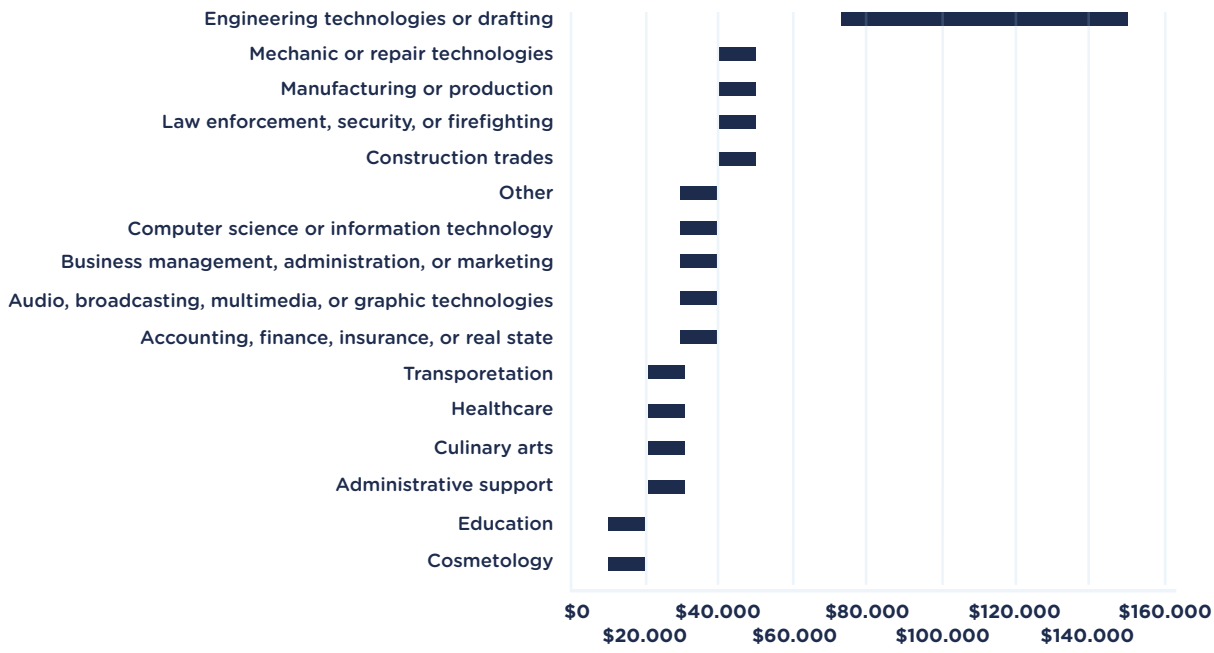


Source: Avvisati et al. (2013).

Conversely, the value of alternative credentials varies across occupations, industries, states, and regions. Overall, higher-wage occupations employ many workers with alternative credentials or licenses (Bol & Weeden, 2015; Weeden, 1999, 2002). Individuals with alternative credentials tend to earn higher median salaries than their peers without credentials (Cronen et al., 2017; Ewert & Kominiski, 2014). When scrutinizing the details, however, some alternative credentials have little or no value in certain disciplines or labor markets, while others can be valuable and give an edge to candidates in, for instance, the IT industry (Adelman, 2000; Rob, 2014; Markow et al., 2017). In most cases, certificates of program completion are not as valuable as certifications, for example, in terms of return on investment (although the literature does not offer direct comparisons on this last point).

First, certificates for completing courses increase individuals' earnings, on average 20%, and boost employability (Carnevale et al., 2012; Dadgar & Trimble, 2015). But these returns vary by fields of study and issuers (Deming et al., 2016; Jacobson, 2011; Jepsen et al., 2014; Xu & Trimble, 2016). For example, workers with academic certificates in engineering technologies or drafting have median earnings between $75,001 and $150,000, which were higher than academic certificates in other fields (Carnevale et al., 2020). Still, in other fields, earning premiums from these certificates are lower than associate's degrees (Bahr et al., 2015) (see Figure 3.8).

Figure 3.8.
Earnings, by discipline, among workers with academic and continuing-education certificates

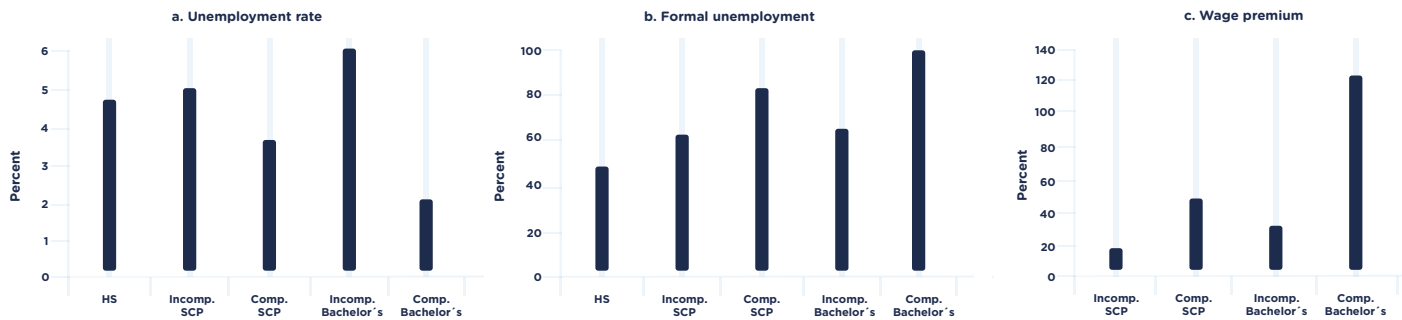


Source: Carnevale et al. (2020)

More recent data also showed that, in the United States, the value of certificates for completing a course in a public or private institution widely vary (Itzkowitz, 2021). In the United States, about half the certificate programs (48%) enabled their graduates to recoup costs within five years, although this figure represents only 35% of all certificate holders (Itzkowitz, 2021). Certificate programs that prepare students to enter a specific profession, such as transportation, industrial equipment maintenance technologies, nursing, criminal justice, or health, showed the quickest ROI. Conversely, programs with broader applications, such as English language and literature, or professions that often underreport their income, such as grooming or therapeutic services, showed no to low ROI (Itzkowitz, 2021).

In Latin America and the Caribbean, SCP graduates experienced better labor market outcomes (in terms of employment rate, wage premium) than college dropouts and high school graduates. Those with bachelor's degree holders did better overall (Ferreyra et al., 2021) (see Figure 3.9).

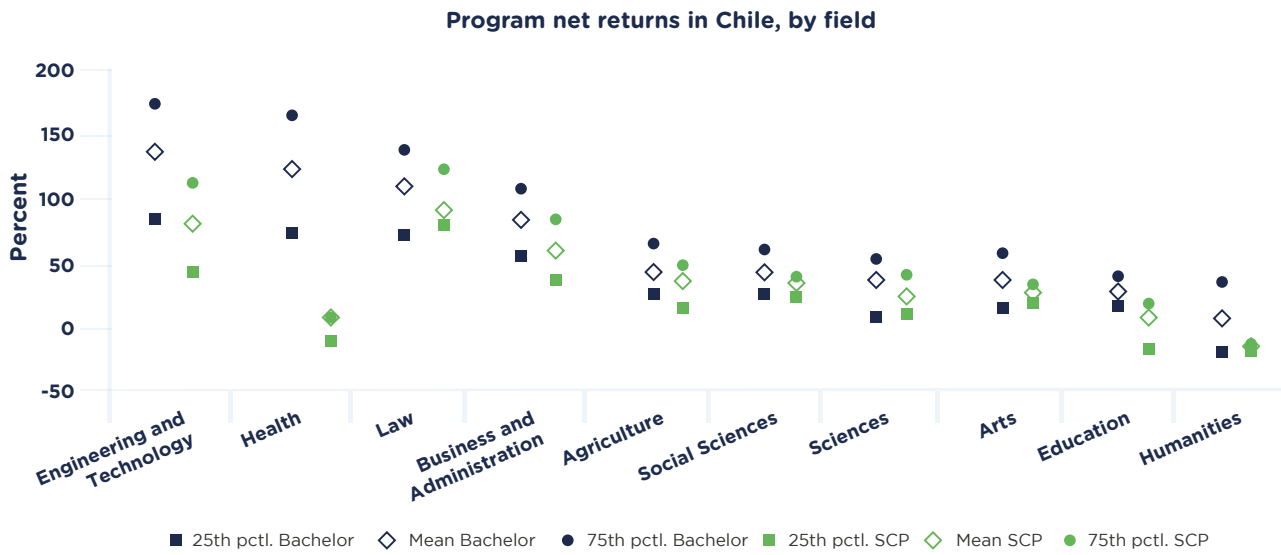
Figure 3.9.
In LAC, short-cycle program (SCP) graduates attain better employment outcomes than high school graduates and college dropouts



Source: Ferreyra et al. (2021),

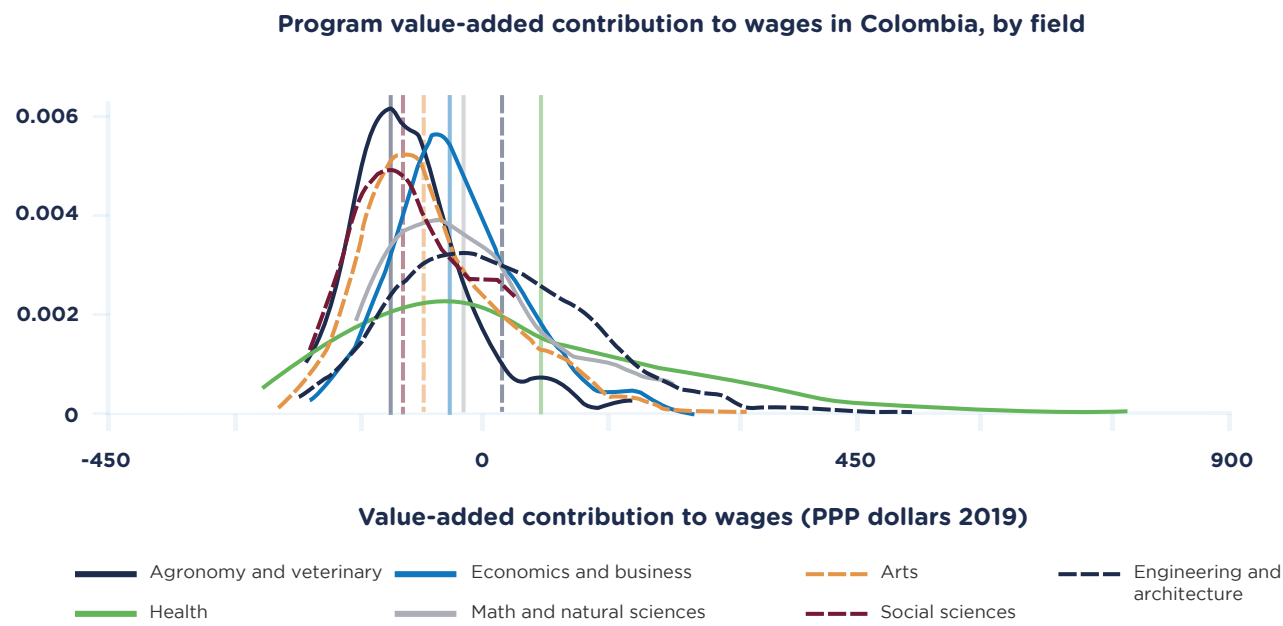
Still, net returns in Latin America and the Caribbean for short-cycle programs varied by program (e.g., engineering or healthcare vs. humanities) (Ferreyra et al., 2021) (see Figures 3.10 and 3.11). For most employers, the relative value of educational credentials has held steady (29%) or risen (48%) over the past five years (Gallagher, 2018).

Figures 3.10.
Net returns in Chile vary among programs and by field of study: SCPs and college programs



Source: Ferreyra et al. (2021),

Figures 3.11.
Short-cycle programs (SCPs) have disparate effects on LAC student outcomes, by field



Source: Ferreyra et al. (2021) and its background paper.

Certifications seem to have the highest value. Controlling for individual characteristics (e.g., high school test scores), individuals with professional certifications had higher earnings than those with none (Albert, 2017). Also, individuals with professional certifications and licenses earned more in the manufacturing field (Renski, 2018), with the highest returns going to those without a bachelor's degree (Baird et al., 2019). Certifications and licenses showed large, meaningful returns, especially for women and sub-baccalaureate labor markets (Baird et al., 2021).

In some fields that value professional certifications, the top 50 certifications accounted for two-thirds of job postings and had salary premiums as high as 18% (Markow et al., 2017). Some professional certifications eased a worker's entry into industries like auto repair (ASE certifications), IT help desk (CompTIA), and welding (American Welding Society [AWS] certifications). Also, other certifications help experienced workers advance their careers by validating their knowledge and skills, including project management, network, and cloud technologies, and IT security with 10% to 45% of salary premiums (Markow et al., 2017) (see Tables 3.4 and 3.5).

Table 3.4.
Salary premium of professional certifications on entry-level positions

Certifiation	% of Entry level Postings esquesting Certification	% of Postings Entry Level	% of Postings Sub-BA	% of Entry level Postings Resquesting Certification	Equivalent Years of Experience
Automobile Service Excellence (ASE)	**29%**	45%	100%	21% ($9,587)	7
CompTIA A+	**19%**	62%	75%	5% ($2,030)	1
American Welding Society (AWS)	13%	45%	97%	9% ($3,077)	1,5

Source: Markow et al., 2017.

Table 3.5.
Salary premium of professional certifications for mid-career positions in network and cloud technologies

	Beginner	Intermediate	Advanced	Expert
Certifiation Name	CompTIA A+ Cisco Certified Entry Networking Technician (CCENT)	Cisco Certified Network Associate (CCNA) Cisco Certified Design Associate (CCDA) Linux + Network + Microsoft Certified Systems Administrator (MCSA) Red Hat Certified Systems Administrator (RHCSA)	Cisco Certified Design Professional (CCDP) Cisco Certified Network professional (CCNP) Certified Coding Associate (CCA) Microsoft Certified Systems Engineer (MCSE) Certified Novell Engineer (CNE) Red Hat Certified Engineer (RHCE) Certified Linux Engineer (CLE)	Cisco Certified Internetwork Expert (CCIE) Red Hat Certified Architect (RHCA)
Additional Salary Premium over Beginner level Certifications	N/A	12% ($5,350)	22% ($10,027)	57% ($26,375)

Source: Markow et al., 2017.

Coding bootcamp certificates and computer science bachelor's degree holders have similar earning potential. The average starting salary for those with certificates from a coding bootcamp is $70,698 (Eggleston, 2017), while those with computer science degrees earn between US$ 50,000 and US$ 140,000 (PayScale, 2020).

Registered apprenticeships secure substantial returns in the United States, but not in the United Kingdom. Apprenticeship participants had an average annual wage premium of $5,839 nine years after completion in the United States (Reed et al., 2012). In contrast, in the United Kingdom, apprenticeships failed to upgrade skills, in part because the programs did not target traditionally marginalized groups (Fuller & Unwin, 2017), including women (Fuller et al., 2005). Still, studies, including a longitudinal one (Ross et al., 2018), found that early-career participation in apprenticeships is linked to future job quality, including income, working hours, and job satisfaction.

Social capital value and networking opportunities

Degrees offer various extracurricular opportunities, friendships, and access to social networks (Goldberg, 2020). Alternative, non-degree credentials tend to offer less of these advantages given their focused content and short duration. In fact, the scant networking opportunities for alternative credential holders have not been thoroughly examined. Some bootcamps arrange prospective interviews with potential employers and interaction with cohorts (Course Report, 2020). Most bootcamps offer career services that introduce students to LinkedIn, GitHub, and other networking opportunities (Rhee, 2021). MOOC courses also offer board and comment functions to bolster students' interaction. Some MOOCs offer career services for students taking micro-credential courses.

Employers' perceptions and premium

University degrees have long held a strong market position based on the academic credentials of the faculty and their role in assuring quality graduates (Miller & Boswell, 1979). Degrees have served as an established proxy for employers, as well as a reasonable excuse in case the hiring does not work out (Goldberg, 2020).

Employers report that they expect, consider, and prefer candidates with certifications for some fields, like human resources (Lester et al., 2011), IT (Wierschem et al., 2010), and manufacturing (Workcred, 2018). In the IT industry, 91% of employers surveyed reported they saw IT certifications as reliable predictors for an job applicant's success (CompTIA, 2015). A study on how hiring managers use certifications indicates that certificates improve the hiring process (Bartlett et al., 2005). Most employers in the manufacturing industry also report that alternative credentials were useful when selecting among job candidates, while large organizations said they prefer workers with credentials (Workcred, 2018).

Some employers value registered apprenticeships in recruiting new workers while they were first honing their skills (Lerman et al., 2010; Lerman et al., 2014). Workers who completed their apprenticeships were more likely to advance and be productive than those who did not complete apprenticeships (Kenyon, 2005).

But even certification-heavy industries may not include alternative credentials in a job requirement. For example, only 0.5% of job postings list certification as a requirement in the human resource field (Aguinis et al., 2005). Given the great number of certifications, employers may not differentiate among the many kinds of credentials (Deterting & Pedulla, 2016). These expectations could vary by industry (Lamback et al., 2018).

Not all alternative credentials are equal. In job postings, employers ask for professional certifications much more often than academic certificates (Markow, 2017). In the United States in 2015, approximately 1.5 million job postings demanded professional certifications, while only 130,000 postings asked for academic certificates (Markow, 2017). It may be that the strong market value of professional certifications emerged from standardized industry-wide criteria, apart from the content and quality of the certificate-granting institutions (Markow, 2017) (see Table 3.6).

Table 3.6.
Job postings for applicants with alternative credentials

Number of job postings listing with alternative credentials			
Top 5 professional certifications	**Number of job postings**	**Top 5 academic certificates**	**Number of job postings**
Certified Public Accountant (CPA)	202,971	Home Health Aide Certificate	18,007
Project Management Professional (PMP)	202,971	Paralegal Certificate	12,234
Certified Information Systems Security Professional (CISSP)	91,981	Phlebotomy Certificate	10,485
Automotive Service Excellence Certification (ASE)	67,973	Medical Billing and Coding Certificate	8,466
Cisco Certified Network Associate (CCNA)	67,746	Typing Certificate	4,245

Source: Markow, 2017.

The numbers of credentials individuals can pursue

University degrees have long held a strong market position based on the academic Individuals can earn relatively few degrees throughout their lifetimes because degree programs take years to complete and are costly. Most individuals earn one or two academic or professional degrees. By way of contrast, alternative credentials are easily amassed for reasons of time and money.

So far, we have reviewed the differences between degrees and alternative credentials across characteristics.

- First, both degrees and alternative credentials could increase human capital, communicate specific technical abilities and productivity (as well as cultural, social, and interpersonal dispositions), and could be used for signaling as a mental shortcut for employers (much more than actual skills and learnings) and to screen and filter employees.

- Second, alternative credentials, such as certificates and certifications, can provide much shorter, less expensive, more accessible, affordable, compact, to-the-point, and versatile solutions to fill skills gaps and help individuals navigate the labor market than academic degrees.

- Third, their market value and recognition still may vary, depending on occupations and skills.

In Part 04, we will review occupations and skills that are more open to alternative credentials than others.

Part 4:

Degrees and Alternative Credentials for Education and Labor Markets

Part 4:

Degree and Alternative Credentials for Education and Labor Markets

Since 2010, 13 million new jobs have been created in the United States alone (Muro et al., 2017). Some professional career clusters are emerging, such as data and artificial intelligence, engineering and cloud computing, product development, care economy, and green economy; some occupations are disappearing (World Economic Forum, 2020).

Education requirements for people to enter an occupation have changed to varying extents by industries and levels. Some occupations are open to alternative credentials, while other occupations require degrees that signify years of education.

The purpose of this section is to identify the types of occupations that are open to alternative credentials, and to review when alternative credentials are helpful. To answer this question, we examined various occupations, their entry-level education requirements, and 2020 median pay using the United States Bureau of Labor Statistics and the European Commissions' Occupation Classification. The caveat here is that these data are from before 2020, and the future might be different. In Latin America and the Caribbean, the fastest-growing occupations are found in the digital economy (e.g., computer science specialists) or services (e.g., food-service professionals), whereas employment is declining for managers and repair and maintenance workers (Azuara Herrera et al., 2019). Then, we will identify when alternative credentials can boost job prospects and skills for students and learners.

4.1. What occupations are not open to alternative credentials?

Most countries require that medical doctors, veterinarians, and pharmacists earn doctoral and professional degrees from traditionally accredited institutions. In addition, most of these professions are licensed by the state. They require alternative assessments as well as state-issued licenses. These occupations with traditional degree requirements also show high median pay. Median annual incomes for medical doctors, dentists, and pharmacists are more than $100,000.

In the medical field, nurses, nursing assistants, emergency medical technicians (EMTs), paramedics, and medical assistants can attain a alternative credential from a state-approved education program, a certification, or a state-issued license. But median pay for these occupations is half that of medical doctors, and ranges from $30,000 to $49,000.

Table 4.1.
Entry-level education and median pay: The medical industry

Occupational groups	Occupation	Entry-level education (U.S. Bureau of Labor Statistics, 2021)	2020 Median pay (U.S. Bureau of Labor Statistics, 2021)
Medical doctors	Dentists	Doctoral or professional degree	**$164,010**
	Optometrists	Doctoral or professional degree	**$118,050**
	Registered nurses	Bachelor's degree	**$75,300**
Nursing and midwifery professionals	Licensed practical and Licensed vocational nurses	Postsecondary non-degree	**$48,820**
	Nursing assistants and orderlies	A state-approved education program and a state-issued license or certification	**$30,830**
Emergency medical technicians (EMTs) and paramedics		A postsecondary non-degree educational program; license required	**$35,650**
Medical assistants		Postsecondary non-degree education, such as a certificate, or on-the-job training	**$35,850**
Veterinarians		Doctoral or professional degree, a state license	**$99,250**
Pharmacists		Doctoral or professional degree, a license after two exams	**$128,710**
Pharmacy technicians		High school diploma or equivalent	**$35,100**
Dietitians and nutritionists		Bachelor's degree	**$63,090**

The same applies to the legal industry. The United States requires a professional degree for judges and lawyers, and most Latin American countries require a legal degree to practice law. In addition to these professional degrees, some countries require that individuals pass the bar examination, an equivalent to certification, in order to practice law. These occupations with traditional degree requirements also show high median pay. Median annual incomes for judges, hearing officers, and lawyers were more than $120,000. Paralegals, legal assistants, and court reporters can attain an associate's degree or postsecondary alternative credentials and short-term or on-the-job training; their median pay ranges from around $52,000 to $61,000.

Table 4.2.
Legal industry entry-level education and median pay

Occupational group	Occupation	Entry-level education (U.S. Bureau of Labor Statistics, 2021)	2020 Median pay (U.S. Bureau of Labor Statistics, 2021)
	Arbitrators, mediators, and conciliators	Bachelor's degree	**$66,130**
	Court reporters	Postsecondary non-degree award	**$61,660**
Legal	Judges and hearing officers	Doctoral or professional degree	**$124,200**
	Lawyers	Doctoral or professional degree	**$126,930**
	Paralegals and legal assistants	Associate's degree	**$52,920**

In sum, the data suggest that traditional occupations require formal degrees: lawyers, judges, medical doctors, and pharmacists; they require long periods of education and training. Some related legal occupations are more open, however, to alternative credentials than these traditional occupations.

4.2. What occupations accept alternative credentials?

In contrast to many traditional industries, some fields, such as information and communication technology (ICT), are open to alternative credentials. The ICT industry accepts certifications and does not necessarily require degrees, while providing competitive pay. People can become computer programmers, developers, security analysts, and computer support specialists without degrees.

Median incomes range from $77,000 to $116,000. ICT credentials have been viable alternatives to traditional degrees (Gallagher, 2016, 2020; Lashan, 2015), and more than 90% of employers surveyed in the IT industry believe IT certifications are reliable predictors of a worker's skill and ability (CompTIA, 2015).

Table 4.3.
ICT industry entry-level education and median pay

Occupational groups	Occupation	Entry-level education (Adapted from U.S. Bureau of Labor Statistics, 2021)	2020 Median pay (U.S. Bureau of Labor Statistics, 2021)
Developers	Computer and information research scientists	Master's degree	**$126,830**
	Computer programmers	Associate's degree; Bachelor's degree; possibly certifications and certificates	**$89,190**
	Computer systems analysts	Bachelor's degree; possibly certifications and certificates	**$93,730**
	Software developers	Bachelor's degree; possibly certifications and certificates	**$110,140**
	Web developers	High school diploma or equivalent; Associate's degree; possibly certifications and certificates	**$77,200**
Database and network	Computer network architects	Bachelor's degree; possibly certifications and certificates	**$116,780**
	Database administrators	Bachelor's degree; possibly certifications and certificates	**$98,860**
	Information security analysts	Bachelor's degree; possibly certifications and certificates	**$103,590**
	Network and computer systems administrators	Bachelor's degree; possibly certifications and certificates	**$84,810**
Computer support specialists	Computer support specialists	Education requirements for computer support specialists vary; possibly certifications and certificates	**$55,510**

The engineering industry employs technicians and drafters who have associates' degrees, certification, and certificates. Their median income ranges from $46,000 to $68,000. Many occupations in the engineering industry still require bachelor's or master's degrees.

Table 4.4.
Engineering industry entry-level education and median pay

Occupational groups	Occupation	Entry-level education (Adapted from U.S. Bureau of Labor Statistics, 2021)	2020 Median pay (U.S. Bureau of Labor Statistics, 2021)
Life science professionals	Zoologists and wildlife biologists	Bachelor's	**$66,350**
Architects, planners, designers	Developers	Bachelor's	**$82,320**
	Landscape architects	Bachelor's	**$70,630**
	Marine engineers and naval architects	Bachelor's	**$95,440**
Mathematicians, statisticians	Mathematicians and statisticians	Master's	**$93,290**
Actuaries	Insurance underwriters	Bachelor's	**$71,790**
	Actuaries	Bachelor's	**$111,030**
Electrotechnology engineers	Electrical and electronics engineering technicians	Associate's	**$67,550**
	Electrical and electronics engineers	Bachelor's	**$103,390**
	Electro-mechanical technicians	Associate's	**$59,800**
Engineers	Aerospace engineering and operations technicians	Associate's	**$68,570**
	Aerospace engineers	Bachelor's	**$118,610**
	Biomedical engineers	Bachelor's	**$92,620**
	Civil engineering technicians	Associate's	**$54,080**
	Civil engineers	Bachelor's	**$88,570**
	Drafters	Associate's	**$57,960**
	Health and safety engineers	Bachelor's	**$94,240**
	Industrial engineering technicians	Associate's	**$57,320**
	Industrial engineers	Bachelor's	**$88,950**
	Mechanical engineering technicians	Associate's	**$58,230**
	Mechanical engineers	Bachelor's	**$90,160**
Physical and earth science professionals	Surveying and mapping technicians	High school diploma or equivalent	**$46,200**
	Surveyors	Bachelor's	**$65,590**
	Atmospheric scientists, including meteorologists	Bachelor's	**$99,740**
	Physicists and astronomers	Doctorate or professional degree	**$128,950**
	Geographers	Bachelor's	**$85,440**
	Geological and petroleum technicians	Associate's	**$50,630**
	Geoscientists	Bachelor's	**$93,580**

A certificate of apprenticeship is another non-degree credential that ushers job seekers into the labor market. In 2018, the United States had over 23,000 registered apprenticeship programs and about 585,000 active apprentices (Torpey, 2019). Occupations that typically require apprenticeships cluster in the construction trades—carpenters, construction laborers, power-line installers and repairers, electricians, heavy and tractor-trailer truck drivers, plumbers, and sheet metal workers (Torpey, 2019) (see Table 4.5). Their median annual wages range from $35,800 to $70,910.

More and more companies in engineering and ICT industries are now offering apprenticeships. IBM offers a 12- to 18-month apprenticeship for software engineers, cybersecurity professionals, and designers (Fain, 2019). For high school and college students and military veterans, Lockheed Martin offers apprenticeships in aircraft maintenance and assembly, software, cyber security, and engineering (Lockheed Martin, n.d.).

Table 4.5.
Apprenticeships by the numbers

Occupation	Employment growth, projected 2018–28	Employment, 2018	Entry-level education (Adapted from U.S. Bureau of Labor Statistics, 2021)	2020 Median pay (U.S. Bureau of Labor Statistics, 2021)
Carpenters	8% (faster than average)	1,006,500	High school diploma or equivalent	**$49,520**
Construction laborers	11 (much faster than average)	1,405,000	Formal education is not typically required; high school diploma or equivalent	**$37,080**
Electrical power-line installers and repairers	8 (faster than average)	119,400	High school diploma or equivalent	**$68,030**
Electricians	10 (faster than average)	715,400		**$56,900**
Heavy and tractor-trailer truck drivers	5 (average)	1,958,800	Postsecondary non-degree award	**$47,130**
Plumbers, pipefitters, and steamfitters	14 (much faster than average)	500,300	High school diploma or equivalent	**$56,330**
Sheet metal workers	8 (faster than average)	143,000		**$51,370**

Source: U.S. Bureau of Labor Statistics [employment growth, employment, and wages]; U.S. Department of Labor (selected occupations, based on federal data on active apprentices in fiscal year 2018); Torpey (2019).

The data above suggest that **new jobs, especially in ICT, are open to people who have skills but no degrees.** ICT industries also provide more high-income jobs. The findings are aligned with existing literature, which notes that ICT certifications have been viable alternatives to traditional degrees (Gallagher, 2016, 2020; Lashan, 2015). Students have attended Cisco, Microsoft, CompTIA, and other certification programs sponsored by technology vendors, securing high-paying jobs without college degrees (Gallagher, 2020).

Employers in the ICT industry can also use performance-based assessment and work portfolios to screen job applicants. For example, employers can review a job applicant's code portfolios, such as GitHub (Fecak, n.d.), and assessments, such as code and whiteboard challenges, in addition to conducting an onsite interview (Learn to Code, 2021; Vigil, 2017). Such additional assessments and portfolios may enable applicants to showcase and update their skills after earning their degrees and alternative credentials.

In the ICT field, both alternative credentials (including certification) and academic degrees continue to influence employment decisions, earnings, and job stability. ICT-certification holders seem to be hired more often than those with academic degrees. But degree holders earned more income and secured more advanced jobs than certification holders (Lashan, 2015). Because so many workers have secured high-paying IT jobs without degrees, we may perhaps conclude that professional credentials can replace university degrees (Gallagher, 2016), at least for entry-level positions.

We've reviewed the occupations that are more open to alternative credentials, we turn to occupations and skills where alternative credentials can be helpful.

4.3. When can alternative credentials be helpful?

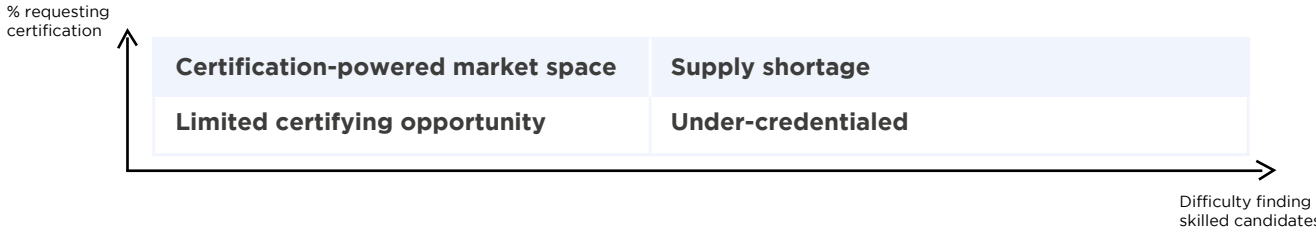
Alternative credentials may have the greatest impact when unmet demand for talent is high, skills can be certified by existing credentialing programs, but employers do not yet make use of such programs (Markow et al., 2017). These conditions characterize markets that lack efficient skill-validation mechanisms.

In Figure 4.1., the two cells on the left show cases where talent is plentiful and alternative credentials are already widely used (top left) or may not add much value (bottom left). In the latter case (limited certifying opportunity), employers do not need alternative credentials to identify talent with skills, as they have no trouble filling jobs with qualified candidates.

In the two cells on the right, a talent shortage exists. In the supply shortage quadrant (top right), employers have a high demand for skills but struggle to find qualified candidates, indicating a shortage of non-degree credential holders to meet demand. By earning a non-degree credential to gain the relevant skills, job seekers could obtain a major payoff.

Conversely, in the under-credentialed quadrant (bottom right), positions are difficult to fill, but there is not much demand for alternative credentials. Here, new non-degree credentialing programs and outreach to employers about their benefits could change the dynamics of the labor market by offering employers a clear proxy for difficult-to-find skills.

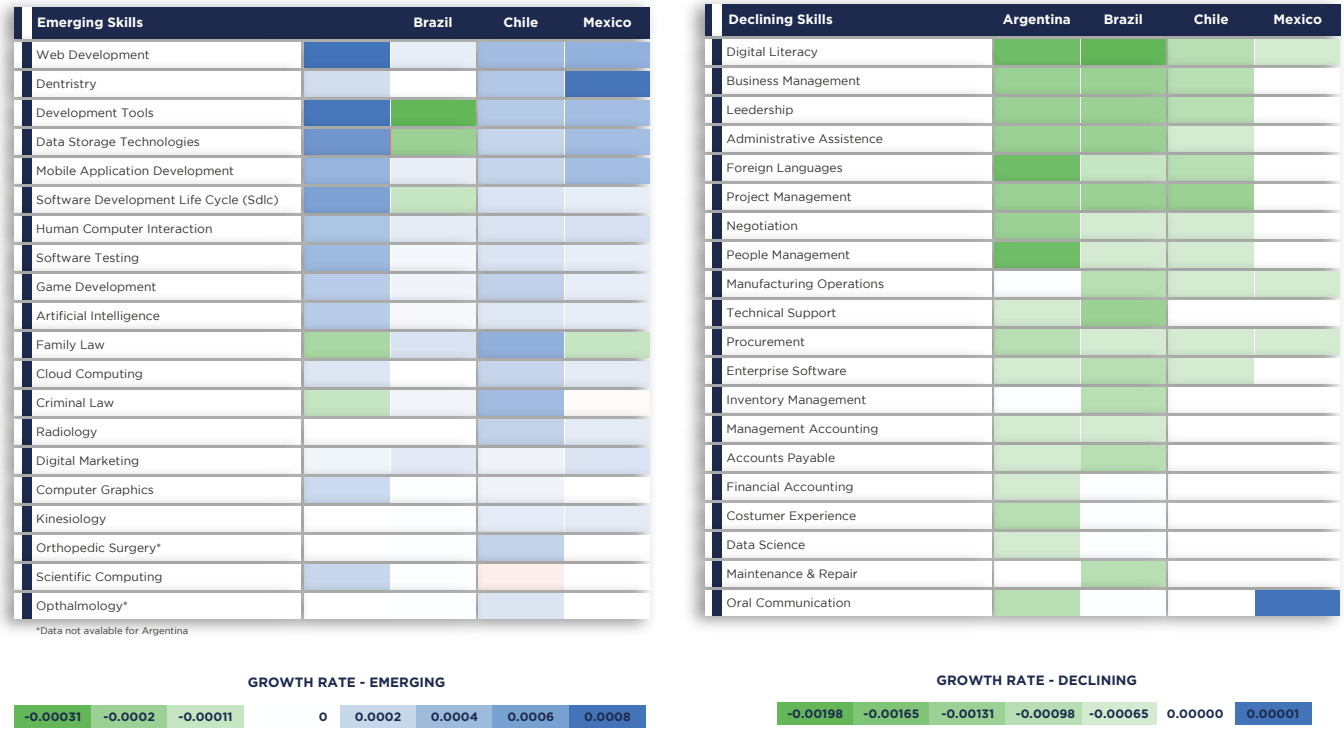
Figure 4.1.
Alternative credentials can help signal high-demand skills and identify talent



Source: Adapted from Markow et al., 2017.

The caveat here is that the market is changeable. For example, CompTIA launched a certification program for data analytics in 2022 (CompTIA, 2021), creating a new credential in an "emerging skills" domain to train individuals and meet the needs of employers. In Latin America, non-degree credential providers can prioritize emerging-skills credentials (see Figure 4.2).

Figure 4.2.
Emerging and declining skills, 2015–17



Fuente: Amaral et al., 2018.

Additionally, alternative credentials can signal the emergence of new, nontraditional skills in response to the new division of labor between humans and machines. Alternative credentials highlight those workers in possession of skills not imparted through traditional curricula or programs. Workers skilled in predictive modeling or user experience could be in high demand, but few traditional education programs teach these skills. By demanding non-degree IT credentials, employers signify their expectations and standards, while would-be workers, credentials in hand, communicate their readiness to work.

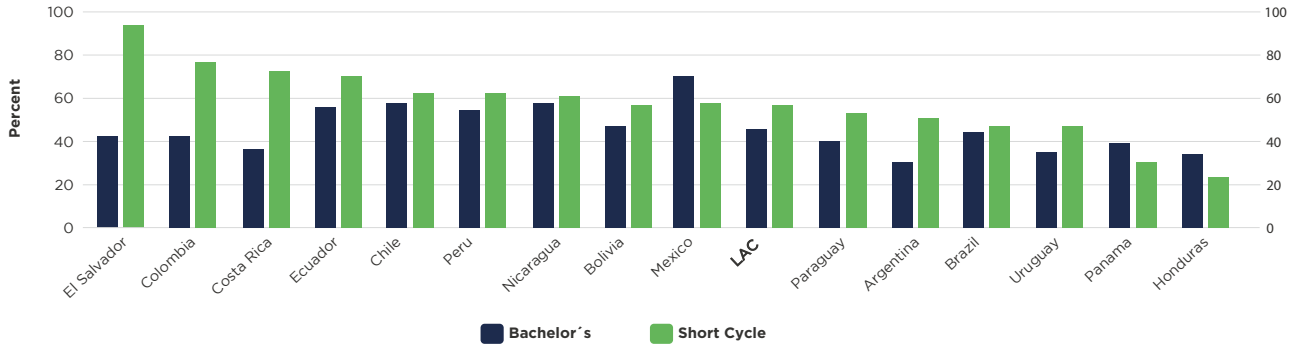
Second, alternative credentials conferred after relevant learning and training programs can boost the prospects among low-income workers and indigenous/marginalized populations. For example, short-cycle programs attract learners who are older, women, non-urban, married, working, and low- to middle-income, while traditional undergraduate programs skew young, urban, and affluent (Ferreyra et al., 2021) (see Table 4.6). Also, short-cycle programs showed higher completion rates than traditional degree programs (see Figure 4.3). They provided higher salaries over the life cycle than high school degrees and better labor market outcomes (e.g., employment rate, wage premium) than college dropouts (Ferreyra et al., 2021).

Table 4.6.
The socioeconomics of short-cycle programs (SCPs) and bachelor's degree programs in Latin American and the Caribbean: A comparison (in percentages)

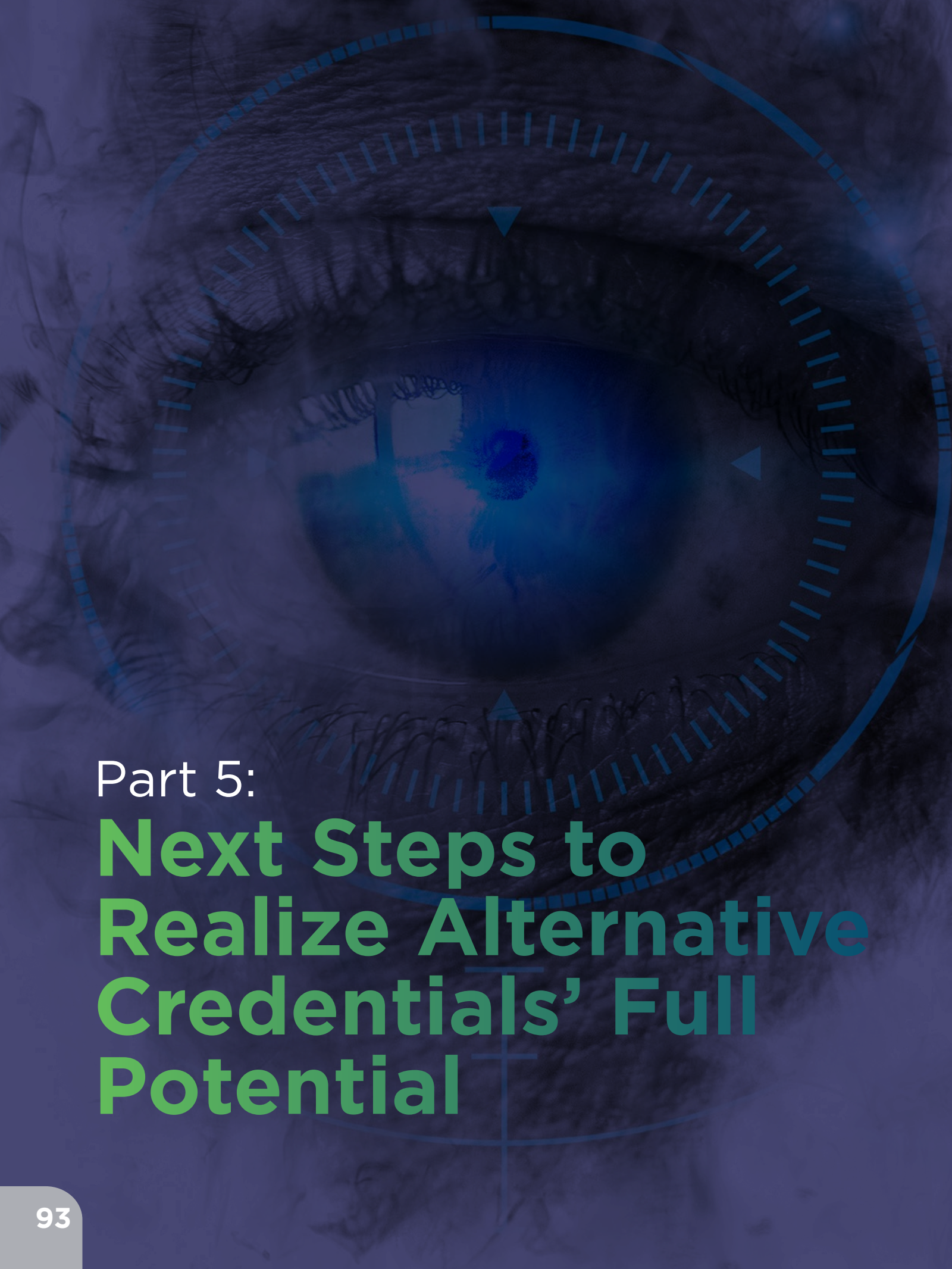
	Bachelor´s students	Short-cycle students
Female(%)	54.5	63.1
Age (years)	24.0	24.9
Urban (%)	90.3	80.8
Married (%)	14.5	22.6
Employed (%)	41.8	43.6
Income Q1 (%)	8.9	14.4
Income Q2 (%)	13.1	17.0
Income Q3 (%)	19.0	23.5
Income Q4 (%)	23.9	25.9
Income Q5 (%)	35.0	19.3

Source: Ferreyra et al. (2021),

Figure 4.3.
In Latin American and the Caribbean, SCPs have higher completion rates than college programs



Source: Ferreyra et al. (2021),



Part 5:

Next Steps to Realize Alternative Credentials' Full Potential

Part 5:

Next Steps: Realizing the Full Potential of Alternative Credentials

Members of the generations coming up may not need a university degree to succeed, at least in some industries. The ICT industries in particular are searching for employees who have rare skills. And the new and emerging jobs in ITC offer competitive wages to those who have the skills, not the academic degrees. A variety of alternative credentials, ranging from certificates to digital badges and micro-credentials, are emerging to meet demand.

Will coming generations need a university degree to succeed in the labor market? Not always. This is especially true if by "university degree" one means a traditional academic course of study over three to five years, culminating in an academic degree. Some occupations in law and medicine will continue to require lengthy courses of post-graduate academic preparation and related assessments, such as bar exams and medical residencies.

Alternative credentials, in addition to supplying in-demand ICT skills, provide aspiring employees with short, affordable, accessible, focused, and versatile training. Alternative credentials are also practical when financial hardship forces a cessation of study (Ferreyra et al., 2021), as happens among the low-income workers with household responsibilities.

In short, to succeed in the workplace, the generation coming up may not need a higher-education degree. Chile, Colombia, and Mexico all place a lofty premium on educational attainment (OECD, 2019). Salary comparisons explain why. Yet, few low-income students can afford three to five costly years of university study to acquire a degree. Cost and duration are, in fact, why so many students drop out.

For students who drop out of school for lack of time and resources, alternative credentials provide practical alternative to a college degree (Ferreyra et al., 2021). They also allow for modularity or stackability. Unlike college courses, in the event students complete only two years toward a bachelor's degree, they get no certificate for the completed courses. In contrast, certificates are awarded even for completed micro-credential courses of study. By way of contrast, the time and money spent on a half-finished undergraduate program are lost when the degree is not obtained. With micro-credentials, courses are shorter. As long as they finish courses, they will receive credentials that can be used in the labor market.

Additionally, alternative, non-degree credentials help current and future employees upskill and reskill as their jobs shift owing to automation and innovation (Ferreyra et al., 2021). A recent analysis of the impact of certifications on U.S. employment and wages showed that women with a certification but no bachelor's degree had higher rates of employment, while men with certifications showed wage gains post-certification as they moved into new fields (Baird et al., 2021). Certifications, and potentially other alternative credentials, may offer a pathway to better jobs and higher wages.

With market disruptions, a vast sea of non-degree credentialing programs has emerged, introducing uncertainty. Will certificates replace traditional degrees? Will the two systems coexist? If so, for how long? What are their main differences and similarities? These are among the questions we have tackled in this report.

It is most likely that traditional academic degrees will coexist with programs that award certificates, certifications, and micro-credentials for attending bootcamps and undergoing specialized training, mostly in ICT. Furthermore, coexistence will be marked by collaboration, partnership, and competition. Although some employers have often been critical of the ways universities and traditional education prepare students, only a few employers stated a hiring preference for workers who possess newer types of alternative credentials in (Gallagher, 2016). Many job openings still state a preference, or requirement, for applicants who have degrees, and students enroll in degree programs that offer, or guarantee, wage premiums (Gallagher, 2016).

So, while academic degrees continue to dominate the labor market, the learning and training industry is nevertheless shifting, with the mix of degrees and alternative credentials signaling that shift. Perhaps as life expectancy increases and skills cycle more rapidly toward obsolescence, the generations coming up may need successive combinations of credentials—including degrees, badges, certificates of course completion and training, or certifications. Tertiary academic institutions could partner with non-degree credential providers to offer both degrees and certificates, or certifications, so that students obtain fundamental knowledge, while mastering industry-specific skills as they strengthen their market competitiveness (Elzey & Cardenas-Navia, 2021; Swift et al., 2020).

What are the challenges and opportunities? As the balance between degrees and alternative credentials shifts, education providers will respond as best they can. Some will survive and consolidate over time. Others will disappear—and not in 2050. This is happening now. Digital education behemoth 2U recently acquired edX for $800 million (2U, 2021; Hill, 2021), this after earlier acquiring both GetSmarter and Trilogy Education. Some ways to increase the acceptance of alternative credentials among employers and prospective students are discussed below.

1. Employer buy-in is critical. The power of certificates comes from the market, from the buy-in of employers. Major employers have become credential-granting organizations in their own right (Gallagher, 2016), such as AT&T sponsoring Georgia Tech's online master's program in computer science, Google's professional certificates (Google, 2022), Amazon Web Services' certification (AWS, 2022), and IBM badges (IBM, 2022). Also, some professional certifications—auto repair (ASE certifications), IT help desk (CompTIA), and welding (American Welding Society [AWS] certifications)—have already been robustly deployed in the labor markets (Markow et al., 2017). Employer recognition bestows value on alternative credentials.

2. Credentials must align with real-world tasks and work experience. Alternative credentials used in professional settings have more value than those designed for other settings (e.g., academic). To understand the use and value of educational credentials in hiring, researchers surveyed U.S. human resource leaders in 2018. They found that recruiters saw high-quality content aligned with real work, along with experiential learning, is key (Gallagher, 2018). The length of the program, its selectivity, or a student's direct interaction with instructors—all central features of traditional academic degrees—come last in importance.

3. Alternative credentials enable employers to identify candidates possessing the skills they need. Alternative credentials convey the possession of certain skills in the education and labor markets (Markow et al., 2017). Providers and employers use credentials to identify workers able to fill the skills gaps.

4. Despite market needs, alternative credentials do not signify a job applicant has soft skills. Professional certifications focus on hard skills (Markow et al., 2017), despite evidence showing that the so-called soft skills are critical for success in work and life (Deming, 2017; Heckman & Kautz, 2012; Edin et al., 2017; Wolvin & Lim, 2022). As a consequence, employers struggle to find job candidates with adequate soft skills (Adobe, 2019; Levy & Cannon, 2016) and to accurately assess them (LinkedIn, 2019). Perhaps this is because these skills are not easy to define, measure, and assess across occupations and contexts (Adobe, 2019; Levy & Cannon, 2016; Markow et al., 2017). Still, with increased automation, soft skills are becoming more important than technical ones (Deming, 2017; LinkedIn, 2019).

5. Employers and students are still learning about alternative credentials. (Gallagher, 2018; Maxwell, 2017). To understand the use and value of educational credentials in hiring, Gallagher conducted a survey in 2018 with human resource leaders in the United States. Among 750 hiring executives in the United States, only 20% hired applicants with alternative credentials, and 30% encountered certificate-holding candidates in a recruitment process (Gallagher, 2018). Even worse, about a quarter had not heard of alternative credentials

(Gallagher, 2018). Such information deficits apply to would-be students and policy makers alike and raises additional barriers to employment of those who hold alternative credentials.

Thus, to fill this information gap, it is critical to identify, provide, and communicate the salaries, costs, funding options, career options, and rates of employment to students, employers, and policy makers (Ferreyra et al., 2021). The U.S. Department of Education has identified, collected, and disclosed such data for degrees at the university and program levels (Copper, 2021a, 2021b; Gillen, 2021; Itzkowitz, 2021; Marcus, 2021). Similar efforts need to be made with respect to alternative credentials.

Additionally, alternative credentials have stigma that they are the lesser choice compared to bachelor's programs (Ferreyra et al., 2021; Fazio et al., 2016). Public and private sector will need to work to remove the stigma and increase alternative credentials desirability by communicating potentials that alternative credentials can provide and success stories.

6. The ROI of alternative credentials needs to be better understood. Individuals and employers can discern the value of alternative credentials only if there is data to support their decisions. While policies in the United States require tertiary institutions to report completion rates, employment, and wages for their graduates, there is no equivalent policy for individuals holding alternative credentials. Scant data shed scant light on the value of alternative credentials.

Administrative data could explain the ROI of credentials. In the United States, credentialing organizations could link their data on credential holders by joining an effort organized by the National Student Clearinghouse, the U.S. Census Bureau, the National Association of Manufacturers (NAM)/Manufacturing Institute (MI), and their manufacturing organization partners to gain insight about the impact of alternative credentials on wages. This approach has been piloted by the National Student Clearinghouse (n.d.) with certification bodies, such as the American Welding Society, NIMS, and Manufacturing Skill Standards Council.

Finally, employers and learners need to be aware of, and to use, information about alternative credentials, including their ROI.

7. Alternative credentials have an uneven quality. Alternative credentials do not have an official or regulated standard regarding delivery, duration, assessment, validation, and content. Employers may find it difficult to differentiate among alternative credentials, especially in comparison with traditional academic degrees (Kato et al., 2020; Pickard, 2018). Additionally, some providers, such as CISCO or CompTIA, have offered alternative credentials for years, whereas tech companies such as Google and IBM only recently ventured into the non-degree credential space (Bariso, 2020; Fain, 2019; Google, 2020). We shall see whether and how these new providers contribute to closing the skills gap. Evidence indicates that industry-wide standardized criteria can be a key factor for the strong market value of professional certifications (Markow, 2017).

To address uneven quality, non-degree credential markets may need quality-assurance processes (Taylor & Soares, 2020). Quality assurance for alternative credentials can be introduced with existing standards: ISO/IEC 17024: 2012 Conformity Assessment—General requirements for bodies operating certification of persons and ASTM 2659: Standard Practice for Certificate Programs.

A global standard for quality, ISO/IEC 17024 outlines a series of requirements for certification. These requirements address conflicts of interest, the use of subject matter experts in the development of the certification, a continuous quality-improvement process, and the occupational relevance of a certification over time. Certifications accredited to this standard provide certainty of relevance. As an international standard, ISO/IEC 17024 can be readily adopted for certifications in any country; it provides an approach to quality assurance that can be immediately adopted for these alternative credentials in any country. It also assists individuals to get their credentials accepted in any country that recognizes the ISO/IEC Standard, increasing the mobility of workers and expanding job opportunities.

Similarly, ASTM 2659 outlines the development and governance standards for a quality assessment–based certificate. Again, these standards require industry experts to be involved in developing the certificate curriculum and to prepare examinations that validate the competencies of an individual who earns the certificate. Used only in the United States, ASTM 2659 could nevertheless be used as an international standard for quality assurance.

Such quality assurance processes provide oversight, supervision, and regulation of the programs and institutions (Ferreyra et al., 2021), although high costs might be incurred with over-regulation. Quality-assurance processes, developed with credentialing organizations, such as ISO/IEC 17024 and ASTM 2659, could lessen the likelihood of over-regulation since they are developed by individuals who run these programs and institutions.

8. Blockchain technology can create verifiable, portable, interoperable, user-controlled digital alternative credentials. Considering the growing potential of blockchain technology and its unique features including decentralization, security, reliability, and data integrity, it would be helpful to use it in validating and sharing credentials in education and labor markets (Alammary et al., 2019; Smolenski, 2021). Blockchain generally refers to "a type of distributed ledger that records an append-only, immutable database of transactions." (Smolenski, 2021). Blockchain technology can store the person's entire learning journey, including learning content, outcomes, achievements and academic certificates while reducing credential fraud risks (Chen et al., 2018; Smolenski, 2021). Additionally, all these can be transformed into a digital currency and stored in a blockchain network (Chen et al., 2018).

9. Skills can be assessed through performance-based evaluations, work portfolios, and other means. Employers, at least in the ICT industry, can ask job applicants to code, as performance-based exams or assessments, and share their work portfolios via GitHub. These screening tasks also enable job applicants to showcase their skills beyond their degrees and alternative credentials. Also, job seekers with credentials can use performance-based test results, rather than the number of course-hours completed, to demonstrate knowledge and skills. Employers will then have more information to assess an individual's ability to perform certain tasks and possess specific skills.

Unlike the postsecondary four-year degree, alternative credentials can be stacked atop each other to meet market demand. This is especially useful for diverse population groups who lack time and resources (Bailey & Belfield, 2017). The alternative credentials also provide a short-term path to well-paying jobs (Workcred, 2020). Short-cycle programs facilitate skills development and can lead to college degrees, although not generally to advanced degrees (Ferreyra et al., 2021). To realize their full potential, the door to other learning pathways needs to open to more stackable, alternative credentials.

Academic institutions and certification bodies have also explored ways to embed certifications into bachelor's degrees (Swift et al., 2020). The value of this approach is obvious: students gain fundamental knowledge and industry-specific skills sought by potential employers (Elzey & Cardenas-Navia, 2021; Swift et al., 2020). Additionally, tertiary academic institutions can become more responsive to market needs (and to employers and students), while certification bodies can raise awareness regarding certification (Elzey & Cardenas-Navia, 2021; Swift et al., 2020).

Traditional postsecondary institutions need to revamp, update, and diversify how they supply their services. A university education must be able to impart skills and knowledge in ways that lead to higher earnings for its graduates, particularly in industries where workers must constantly upskill to prevent the massive and looming displacements of workers owing to the automation of routine, predictable tasks.

We need to ensure that individuals continue their learning trajectories after leaving school. For many, the difference between low-income and middle- to high-income jobs could be a matter of skills, such as digital skills (Muro et al., 2017).

The Inter-American Development Bank is building a new platform for the acquisition and certification of 21st-century skills. The emerging platform is presented in Box 1.

Box.1 A new initiative to develop and certify 21st-century skills

Putting many of the above ideas into practice, Clic is a platform being developed by the Inter-American Development Bank for countries in Latin America and the Caribbean to certify 21st-century skills (or, transversal skills), generate information and evidence, and manage talent more effectively for individuals and for public policy and planning purposes.

Clic is a regional platform to help students develop and certify 21st-century skills. It supports education and training systems to implement effective programs that develop transversal skills for work and life.

Specifically, Clic helps identify, develop, validate, and communicate 21st-century skills by making these invisible set of skills visible and connecting the disconnected. It increases the chances of opening doors for jobs and personal growth through gamification, peer-to-peer interactions, and a community network. Specifically, Clic does the following:

- **Assess** skills with the patronage of academic rock stars!
- **Certify** skills with self-reported assessment, performance-based assessment, and peer endorsement
- **Showcase** skills by leveraging a personalized digital portfolio
- **Build** a regional community network of peer-driven support and interaction

Clic promotes a cultural change in training to expand opportunities, transitioning from the logic of degrees to the logic of alternative credentials for developing and certifying skills.

More and more people are using alternative, non-degree credentials to advance in the education and labor markets. This is happening in traditional and emerging markets, including Latin America and the Caribbean. Changes are occurring more rapidly, and with greater impacts, in developed countries.

If people do not need a college degree to advance in their jobs, and avoid spending years and money, that would be good news—not just for a market begging for more upskilled and reskilled people, but also for social mobility and prosperity of those individuals in search of better economic opportunities.

The government must play a role. But the private sector, which is by far the largest employer, must alter its perceptions, hiring habits, and career development programs to increase opportunities for workers without college degrees (Lohr, 2020).

This is a wake-up call for traditional formal education and training systems to adapt to a world in transformation. Based on our experience of the 21st-Century Skills Coalition at the Inter-American Development Bank, our call for action implores the public and private sectors to learn from and collaborate with each other.

Only by strengthening the training and employment ecosystems with public-private partnerships can we bridge the massive skills gaps. Only if the Latin American and Caribbean region bridges the talent gap will its countries be able to prosper, innovate, and compete globally.

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