

THE CHRONICLE OF HIGHER EDUCATION®

The **Future** of

The Degree

**How Colleges Can Survive
the New Credential Economy**



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American higher education is in the midst of a credentials craze. In response to questions about the value of the college degree and its meaning in a changing workplace, colleges, industry groups, MOOCs, and private companies are rolling out a wave of new types of credentials. In

many ways, this period is reminiscent of the decades before the Civil War when a growing country saw major debates about the role of higher education. Was it for a classic education in the arts and languages? Or for the vocational needs of the emerging industrial and scientific era? During that time, new degrees were created, such as the bachelor's of science, although the need for them was questioned by many in the academy and they often came with fewer requirements.

The period was marked by experimentation with curricula and credentials, much like the current times. This report gathers the latest trends about the future of credentials in three sections:



Section 1 **Credentials as a Currency for Colleges**

The college diploma hasn't always been the primary qualification to enter the job market. For much of its history, higher education had a tortured relationship with awarding credentials, even though they eventually became the foundation of the academic business model. The college degree evolved into the currency of the job market over four distinct periods in the history of higher education as employers wanted assurances that, as they increasingly relied on degrees in hiring, the credentials were somewhat equal no matter where they were given. But as the economy undergoes transformative change, a degree based on a standard of time in a seat is no longer sufficient in an era where mastery is the key. As a result, we are living in a new period in the development of the degree, where different methods of measuring learning are materializing, and so too are diverse and efficient packages of credentials based on data.



Section 2 The Ultimate Value of the Degree

As the skills and competencies needed to keep up in almost any career spiral ever higher in a digital economy, college degrees at all levels simply can't keep up. As a result, the disconnect between what employers want and what the degree communicates grows ever wider and begins to fracture the economic principles that have sustained the college business model for more than three decades. Employers are increasingly questioning whether the credential remains a signal of job readiness in an era when more adults have degrees and fewer of them graduate with the soft skills needed in the workplace. What's more, with more degrees in circulation, they are no longer a convenient screening mechanism for recruiters. The hope among higher-education officials is that this period of change will provide more value to a degree by focusing solely on the components of the campus experience that contribute to student learning.



Section 3 The Lifelong Credential

With Americans now less likely to stick with one employer for decades, the message from employers to their workers is this: You're on your own to manage your career and obtain further education. This shifting system requires colleges to rethink what higher education needs to be — not a specific one-time experience but a lifelong opportunity for learners to acquire skills useful thorough multiple careers. In many ways, the journey to acquire higher education will never end. From the age of 18 on, adults will need to step in and out of a higher-education system that will give them the credentials for experiences that will carry currency in the job market.

H igher education trades in its own currency. Colleges and universities award credits for classroom instruction, online courses, internships, research projects, and other academic activities. Those credits have value within the academic ecosystem — they can often be transferred between institutions — but are essentially worthless in the outside world. Rarely will job advertisements ask for college credits without a degree. But pool all those credits together into something called a credential and suddenly they matter outside the campus walls.

College credentials, including certificates and degrees (all terms that will be used interchangeably throughout this paper), have been the gold standard in the generation-long transition of the United States away from manufacturing and into a diverse, information-driven economy. More than ever before, jobs today demand complex reasoning and interpersonal skills, and some sort of postsecondary education is the best way to demonstrate those skills to employers.

As a result, the number of people earning a college degree has skyrocketed over the last four decades. Some 3.8 million degrees — including associate, bachelor's, master's, and doctorates — were conferred by U.S. institutions in 2015, more than double the number given in 1980. Another 680,000 certificates were awarded in 2015. The college credential has become an increasingly important signal in the job market, one that grows only stronger the more selective the institution and the more advanced the level of education.

But these days in the rapidly changing world of work there is plenty of noise surrounding that signal. Three main developments have begun to shift thinking about the degree as the best insurance for better jobs and higher wages.

First, employers are increasingly questioning whether the degree is the best indicator for job preparedness. One poll by Gallup found that only 11 percent of business leaders strongly agree that college graduates have the necessary skills and competencies to succeed in the workplace. Assessment tests of college graduates seem to support that view. At more than half of the colleges where the College Learning Assessment Plus is used to measure learning gains by testing freshmen and seniors, at least one-third of seniors showed little or no improvement in critical-thinking skills over four years.

Second, the overall increase in the number of people earning credentials has made some less valuable. In many ways, the bachelor's degree is the new high-school diploma. A

2017 study published by the National Bureau of Economic Research found that while the wage premium of the bachelor's degree grew rapidly in the 1980s, its growth slowed in the 1990s, and has largely remained unchanged since 2010. The reason? Technology. In all industries, automation has begun to supplant jobs held by workers with four-year degrees. So workers with a bachelor's degree are forced into lower-skill jobs with lower wages. Rather than a ticket to a high-paying, managerial job, the four-year degree is now the minimum qualification to get in the door to any job, thus requiring additional credentials to advance in a career.

Third, and perhaps most important, the world is growing ever more complicated, and career paths are more chaotic. By the beginning of the next decade, more than one-third of skills considered important in today's work force will have changed, according to the World Economic Forum. In a knowledge economy that churns so quickly, the combination of skills that workers possess may matter more than a specific degree. In this future, a cre-

In a knowledge economy that churns so quickly, the combination of skills that workers possess may matter more than a specific degree.

dential that certifies competencies rather than simply the completion of a curriculum could turn out to be a better match for a job market where entire occupations are expanding and contracting at an alarming pace.

The Rise of Predictive Hiring and the Weakening of the Degree Signal

Today, employers of all kinds and sizes are searching for additional signals beyond traditional degrees to evaluate job candidates. Gone are the days when companies would show up at campus career fairs, interview several dozen students, hire a few, and hope they work out.

The first shift in hiring happened over the last decade when many large organizations outsourced recruiting to automated software. Applicant tracking systems search for key words, including credentials, in a job seeker's materials and automatically discard those missing the necessary requirements, all without the intervention of a person. But applicant tracking systems are often a crude way of sorting talent. Peter Cappelli, a professor at the University of Pennsylvania's Wharton School, has found in his research that such systems are too finely tuned, dismiss even qualified applicants, and are to blame for the persistent skills gap that employers complain exists in the job market.

As a result of the limitations of automated software, employers are increasingly mining their own data on employee performance to guide their hiring of the next crop of talent. By applying predictive analytics to people's careers, companies are following in the footsteps

of professional sports teams that use data to evaluate talent — a process made famous by the book and movie *Moneyball*, about how the Oakland Athletics fielded an inexpensive, yet competitive, baseball team. Human-resources offices at major companies are harnessing thousands of pieces of data in an emerging field called “people analytics” to figure out why and how their workers are hired, fired, and promoted. In doing so, they are discovering that many of the components of a degree — courses, grades, and major — and the accompanying transcript are poor predictors of success on the job.

“Grades and test scores are just one dimension of a person, often from years earlier,” said Laszlo Bock, the former senior vice president of people operations at Google and author of *Work Rules!* “The combination of intelligence and learning ability is what makes people successful, and the degree doesn’t signify either.”

Google was one of the first companies to widely adopt data in hiring and rely less on the credential as the primary signal. Some 4,500 companies now have at least one employee focused on people analytics. This use of data in hiring is part of a larger shift in the matchmaking between employers and job candidates that is poised to transform what college credentials communicate in the future job market.

People analytics is the next front in the war for talent. Much like the invisible algorithms used by Netflix, Amazon, and Spotify to recommend movies, books, and music, predictive hiring technology combs the materials submitted by applicants as well as their online profiles on sites such as LinkedIn or company-specific talent management platforms looking for the best-fit candidates.

For job applicants, tools like LinkedIn offer needed transparency to the job search because users can find other people with the jobs they want and discover what competencies they might be missing in their search for the perfect position. For employers, the platforms provide access to a broader array of signals beyond just degrees and the keywords embedded in a résumé. Such a system might turn out to be better attuned to the needs of employers and job applicants, but over time

could diminish the importance of the degree as a key signal in hiring.

A New Mix of Degree Options for Students

Such a change in mind-set will have significant consequences for colleges and universities. Higher education has multiple missions in society, including expanding students’ minds and preparing citizens for the world. By focusing on career readiness, this paper does prioritize one mission over another. The signal of the degree in the job market has long sustained higher education’s business model; so any change in how credentials are valued in the economy could impact the bottom line of campuses.

If you think of degrees as the end product of higher education, the mix of offerings from colleges and universities hasn’t changed much in decades, even centuries. While institutions have added a myriad of academic programs, the basic underlying process of earning degrees has remained largely the same — it’s time consuming, often expensive, and usually

“The combination of intelligence and learning ability is what makes people successful, and the degree doesn’t signify either.”

offers students much more than they need at a particular point in their lives.

Degrees offer a buffet of courses when all some students need is a single entree, knowing they will need to come back six months or a year later for more. This is one reason why enrollments in professional master’s degrees have fallen, along with demand for

M.B.A.s, as students find short-term programs to satisfy their immediate training needs at a fraction of the cost of an advanced degree. That's not to say graduate education is going to collapse in the United States, but it's clear universities need to offer a broader cluster of products beyond traditional degrees to serve that audience.

The same is true at the undergraduate level. A majority of the occupations with the biggest growth opportunities over the next decade, according to the Bureau of Labor Statistics, will require a postsecondary credential. Two- and four-year degrees, in particular, seem unlikely to suffer the disruption happening in the graduate market right now, because they are seen as the door opener for many jobs. Even so, employers report a range of skills needed in workers on Day 1 that they feel are not embedded in traditional undergraduate diplomas. That's why employers are asking for more than just a degree in many job advertisements. An analysis by Burning Glass Technologies, which reports on the job market in real time by studying job ads, found that one in five non-health-care jobs requiring a bachelor's degree also called for a certificate or licenses.

The surge in knowledge needed in the workplace is out of sync with the speed of learning in college. Human knowledge is doubling every 13 months, on average, and IBM predicts that in the next couple of years, with the expansion of the internet of things, information will double every 11 hours. That requires colleges and universities to broaden their definition of a degree and their credential offerings.

Given the projected growth in the knowl-

edge and service economy in the future, what credentials will workers need to communicate their skills and competencies to compete in a world of automation and artificial intelligence? This report aims to answer that question in the sections ahead by examining job-market

Human knowledge is doubling every 13 months, on average, and IBM predicts that in the next couple of years, with the expansion of the internet of things, information will double every 11 hours.

trends and the approaches employed by colleges and the professional credentialing space.

The first section of the report offers a brief **history of credentials** and the risk higher education faces by clinging to the traditional structure of degrees in the face of a shifting economy. The second section explains what **degrees communicate in the job market and how that needs to change**. The third section looks at the **future of credentialing** and what the landscape might look like in a few years.

SECTION 1



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A Currency for Colleges

Higher education today is largely seen by students as preparation for a good-paying career, with colleges as the sorting mechanism for those jobs. This sorting process starts during the annual college admissions season when students are separated by the selectivity of institutions based on their grades and test scores. Another culling of the ranks happens on campuses when students self-select into majors. Finally, the credential awarded at the end of college indicates that students had the discipline to finish what they started and gives confidence to employers that they are ready for the workplace.

It's worked this way for several generations — since the end of World War II, when returning GIs went to college for free and started a decades-long expansion in the number of Americans with a postsecondary degree. But

the college diploma hasn't always been the primary qualification to enter the job market as it is now. For much of its history, higher education had a tortured relationship with awarding credentials, even though they became the foundation of the academic business model. To imagine what credentials might communicate in the future economy, it's critical to understand how the college degree turned into the currency of the job market. Degrees can feel static and permanent, but throughout history they've been in constant flux. There is no reason to think that's going to stop. **Four distinct periods** in higher education offer lessons for today's college leaders in why debates about the value of degrees are deeply rooted in the evolution of the economy and how colleges came to be in this business in the first place.

At first, the degree didn't matter. From the time Harvard opened in 1636, colleges were seen as producing a “learned clergy and a lettered people.” Access to higher education was limited to a small number of people and mostly intended to train lawyers, ministers, and statesmen — men, as Frederick Rudolph

described in his exhaustive history of American colleges, “who would spell the difference between civilization and barbarism.” There were no courses, and the curriculum was derived from the classic liberal arts: geometry, rhetoric, grammar, arithmetic, history, and astronomy. Students studied a subject a day from morning into the early evening, and the prevailing pedagogy was recitation (repeating lessons verbatim) and debate.

While access to colleges grew after the American Revolution as states raced to open institutions in the same spirit as “canal-building, cotton-ginning, farming, and gold-mining,” according to Rudolph, many institutions had few students and were little more than one-room academies, if they even had a building. Degrees were rarely conferred, and many of the newly formed colleges struggled to stay afloat. In a warning to today’s college officials who believe that the credentials their colleges award are a public trust, and as a result, their institutions won’t fail, it is estimated that nearly 700 colleges started *and* closed before the Civil War. If the public doesn’t trust your degrees, institutions won’t survive (just look at the recent history of the for-profit higher-education sector for an example).

This era in American history, from the 1820s through the beginning of the Civil War, was an important turning point for higher education in its credentialing role. The Industrial Revolution forced colleges to rethink their curriculum from solely focusing on the liberal arts to incorporating the practical arts to serve the growing legions of factories, railroads, and mechanized farms. In 1824, Stephen Van Rensselaer founded the Rensselaer Polytechnic Institute in upstate New York to impart “a very useful kind of knowledge, with its application to the business of living,” as he wrote in a letter at the time.

Not all college leaders in the young nation agreed with Van Rensselaer’s belief that higher-education institutions needed to focus more on practical education. In 1828, Yale released a widely cited report that dismissed vocationalism and the growing move toward credentialing the professions and said students should study a variety of topics to develop all areas of their minds. But within two decades, Yale’s hold on the classic curriculum started to give way to the

advances of the Industrial Revolution and scientific discoveries. What followed was a period of enormous change for the degree that is eerily similar to what higher education is going through right now.

The second stage in the development of the degree validated new academic disciplines and solidified the role of colleges

The issue is whether in the absence of degrees, employers will begin to look at other signals that someone is job-ready.

in credentialing the professions. In 1851, Harvard awarded the first bachelor-of-science degree. Between 1860 and 1870, another two dozen institutions would open science departments and award degrees. Still, the B.A. degree was seen as superior. Harvard, for instance, had lower admissions standards for science students, and the length of their degree was three years instead of the normal four.

Perhaps the biggest proponent at this time of better connecting higher-education credentials to the needs of the economy was Brown University’s president, Francis Wayland. In 1850, in a report to the Brown governing board, he called for a radical change in how colleges educate students, proposing among other things to end the fixed four-year degree by moving to a flexible program of two to six years. His main concern was that colleges risked becoming irrelevant if they didn’t fall into line with the main economic and social developments of the age. His changes proved unpopular, however, and within a few years he was replaced by a president who promised that the university’s aim would be to “make Scholars and not ...

1.1: CREDENTIALS IN THE UNITED STATES

DOCTORATE DEGREE		All Americans, 2008
	degree and certificate	274,000
	degree and certification/license	1,004,000
	degree	1,531,000
PROFESSIONAL DEGREE		
	degree and certificate	436,000
	degree and certification/license	2,178,000
	degree	1,015,000
MASTER'S DEGREE		
	degree and certificate	2,180,000
	degree and certification/license	7,018,000
	degree	8,291,000
BACHELOR'S DEGREE		
	degree and certificate	4,027,000
	degree and certification/license	11,447,000
	degree	26,196,000
ASSOCIATE DEGREE		
	degree and certificate	3,059,000
	degree and certification/license	5,409,000
	degree	11,457,000
SOME COLLEGE		
	some college and certificate	4,243,000
	some college and certification/license	8,064,000
	some college	32,134,000
HIGH SCHOOL		
	degree and certificate	4,482,000
	degree and certification/license	9,891,000
	degree	59,056,000
LESS THAN HIGH SCHOOL		
	and certificate	411,000
	and certification/license	1,315,000
	less than high school	22,240,000

SOURCE: Georgetown University Center on Education and the Workforce analysis of U.S. Census Bureau, Survey of Income and Program Participation, 2008 Panel, Wave 13 data.

miners, apothecaries, doctors, or farmers.”

Even so, the seeds were planted by Wayland and his allies for a major shift in how higher education viewed its role to serve society, and it came in 1862, when in the midst of the Civil War, President Lincoln signed the Morrill Act, which gave land to the states to build agricultural colleges. In addition to agriculture, programs were created in mechanics, engineering, and manufacturing. The number of vocational majors took off. In 1870, nearly 50 percent of higher-education enrollment in the U.S. was in the liberal arts; by 1880, only 30 percent was.

By the turn of the 20th century, the bachelor's degree as a hiring credential was cemented in the minds of business and government leaders, and universities responded by creating entire schools in education, business, public administration, and journalism to appeal to a growing enrollment of students who wanted to earn credentials and employers who favored hiring college graduates. New professional master's degrees were established at this time, alongside the first U.S.-based Ph.D. programs imported from Germany.

The first associate degree was awarded at the University of Chicago in 1900 as a credential to signify the end of the sophomore year of college. It was an idea ahead its time. Today, we call the concept of slicing degrees into smaller and smaller pieces to convey incremental advances in learning “stackable credentials.” The president of the University of Chicago later helped co-found Joliet Junior College, the first public community college in the United States. The associate degree became synonymous with two-year colleges. Today, there are more than 1,000 public community colleges that in 2016 awarded more than a million associate degrees.

Leaders

Harvard College is founded in 1636, and the purpose of it and the colonial colleges that would follow in the late 1600s was to train the leaders of the colonies. The degree didn't matter as a pathway to a career as most people entered work through apprenticeships.



Library of Congress

Alternative Curriculum

A parallel curriculum is introduced at Miami University in Ohio in 1825, with courses in modern languages, applied mathematics, and economics, in an attempt to make college more meaningful and useful for contemporary life. The alternative curriculum is not without controversy, and so comes with a certificate of proficiency instead of a bachelor's degree.

Credentials Criticized

In 1828, Yale University releases an influential report that is critical of vocationalism in the curriculum and the growing movement toward credentialing the professions.

1700

1800

Sciences Gain a Foothold

A professorship in mathematics and natural philosophy is founded at Harvard in 1727, and the sciences begin to make inroads in the curriculum.

Landmark Degrees

1851: Harvard awards the first bachelor of science degree. The credential has lower admissions standards compared to bachelor of arts and is a three-year degree instead of the normal four.

1856: First stand-alone master's degree awarded by the University of North Carolina, after a one-year program of formal study and the presentation of a thesis.

1861: First research doctorate in the United States awarded by Yale.



Library of Congress

Morrill Act

Passed into law in 1862, the act gives land to the states to build agricultural colleges.

The land-grant colleges also create programs in mechanics, engineering, and manufacturing, and as a result, the number of vocational majors takes off.

First Associate Degree

Awarded at the University of Chicago in 1900, it is a credential to signify the end of the sophomore year of college.

Education Requirements

In a 1919 response to the growing fragmentation of knowledge, Columbia University puts in place general education requirements for the bachelor's degree, declaring that there is "a certain minimum intellectual and spiritual tradition" that people must understand if they were to be called educated.

GI Bill

The Servicemen's Readjustment Act of 1944, also known as the GI Bill, is passed, opening the doors of college to a wider group of Americans than ever before and beginning a growth spurt for credentials of all kinds.



Bettmann, Getty Images

1900

2000

Associate Degree Comes of Age, 1963

The associate degree comes of age as a quarter of students enrolled at community colleges are in occupational programs, from which they move directly into the job market instead of continuing on for a bachelor's degree.

Good Paying Jobs for High School Grads Disappear

In 1983, a recession decimates the manufacturing sector essentially killing off good-paying jobs for high-school graduates without a college degree. The wage premium for a college degree stands at 42 percent.

Master's Expansion

As more people earn a bachelor's degree, the master's degree begins a decade-long expansion in 2000. Colleges add part-time and online programs in a variety of professional fields.

Wages Stall

In 2010, the growth in the wage premium for the bachelor's degree stalls around 80 percent, as the four-year degree becomes a ticket to any job, not just a high-paying, managerial job.

Birth of MOOCs

In 2012, massive open online courses (MOOCs) capture the imagination of the public and higher education as three providers, Coursera, edX, and Udacity, emerge from experiments at Stanford and MIT. The development sets the stage for the introduction of new microcredentials later in the decade.

Higher education's growth spurt at the turn of the century created new degrees and more student choices in the curriculum as new courses on campuses shot up. Standardization was the buzzword in industry at the time, and that spread to higher education — employers wanted assurances that, as they were increasingly relying on colleges degrees in hiring, the credentials were somewhat equal no matter where they were given. The Association of American Universities was founded in 1900, in part to establish standards for degrees and institutions.

Colleges also needed a way to account for time in courses and student progress toward a credential. It just so happened that in the early 1900s the nonprofit Carnegie Foundation for the Advancement of Teaching was designing a system for professors to determine their teaching loads and eligibility for a new pension system. The credit hour was established for that purpose — one hour of direct faculty instruction and two hours of work outside of class each week during the semester — and it soon became a standard for measuring student progress through college.

The architects of the system never intended that it would become a way to measure student learning. In fact, the Carnegie foundation warned against that construct in discussing the new unit in its annual report in 1906, writing that “the fundamental criterion” in counting credit hours “was the amount of time spent on a subject, not the results attained.” Even so, the credit hour became the unit of measure for the degree among colleges and government regulators, and since then it's often been the biggest hurdle to changing the underlying structure of the credential.

The third major phase in the evolution of the college degree cemented the relationship between a credential and the job market. The decades after World War II, when enrollment ballooned as the “college for all” movement took off, are considered the start of the modern era of higher education. In 1975, 50 percent of high-school graduates went right on to college the following fall; by 2000 that number approached 64 percent. The early 1980s recession effectively killed off manufacturing jobs for high-school graduates, leaving basically

anyone who wanted a good-paying job in the knowledge economy no other choice than to get a college credential. The so-called wage premium of a college credential — how much more a typical bachelor's-degree recipient earns than a high-school graduate does— turned into a runaway train, rising from 42 percent in 1983 to 80 percent today.

Markets for credentials were created where none existed before. Degree requirements for jobs started to creep upward to ever more advanced credentials. For decades, a bachelor's degree was sufficient to become a pharmacist, a physical therapist, or a nurse practitioner. By 2015, the doctorate replaced the bachelor's as the minimum recommended to practice in all three occupations. What's more, states required that more professionals, from interior designers to athletic trainers, get a license, and many require applicants to get a credential just to sit for a licensure exam.

Two kinds of credentials that had been a footnote in the history of American higher education were the clear beneficiaries of degree inflation: certificates and master's degrees. Certificates — skinny versions of degrees, mostly in vocational fields — take

The number of people with a master's degree is now about equal to those with a bachelor's degree in 1960.

anywhere from one to four years to complete. The number of certificates awarded skyrocketed 800 percent over the past 30 years. In 1984, less than 2 percent of adults 18 and older had a certificate as their highest educational attainment; by 2009 the percentage had grown to almost 12 percent, according to the Census Bureau.

Meanwhile, the master's degree moved from being a bonus awarded on the way to a

research-based Ph.D. to a credential sought by bachelor's-degree recipients who wanted to differentiate themselves in the job market. During the first decade of this millennium, the master's degree was the fastest-growing degree in higher education. In 2010, about 693,000 were awarded, up by more than 50 percent from a decade earlier. The number of people with a master's degree is now about equal to those with a bachelor's degree in 1960.

This period in the expansion of credentials — from the end of World War II through the baby boom, the Cold War, the Tech Revolution, and the arrival of the millennial generation on campuses — marked a golden era for higher education (see Figure 1.1). Then came 2011, a year that might be remembered for “peak credentials.” Enrollment in all levels of higher education hit a high point, and the classification of credentials that served this modern era may have reached the end of its lifecycle, at least in its current form.

Soon after, the credential landscape that developed over the previous six decades started to shift. Elite universities extended their brand names to start-ups issuing new kinds of certificates through massive open online courses (MOOCs). The Mozilla Foundation and the MacArthur Foundation introduced a framework for digital badges that could show competence in specific skills, and be granted by colleges, companies, or even individuals. And venture capitalists invested tens of millions of dollars in new companies focused on training (Pluralsight) and tracking credentials (Degreed and Parchment). Higher education is now firmly situated in the fourth stage of credentials.

In this fourth period, new methods of measuring learning are materializing, and so too, are diverse and efficient packages of credentials

Markets for credentials were created where none existed before.

Degree requirements for jobs started to creep upward to ever more advanced credentials.



QUESTIONS TO CONSIDER

As colleges begin to identify areas where degree offerings are threatened or where opportunities exist for growth, here are some key questions for officials to consider:

WHERE has your growth been in degrees, by level and program? Where have there been declines?

WHAT other credentials, such as certificates and licenses, do your new graduates need to secure jobs, beyond a bachelor's degree? Can those credentials be embedded in your academic experience?

HOW do your academic programs align with growth in specific jobs and the credentials they will require in the future?

ARE THERE additional credentials and training you can offer as an add-on to your bachelor's program that can assist new graduates in the job market?

WHICH credentials do your graduates go on to earn next? Why? How many attend your institution to earn their next credential? Why or why not?

based on data. Arthur Levine, president of the Woodrow Wilson National Fellowship Foundation, likens this period to the disruption in credentials following the Industrial Revolution, when colleges added the sciences, professional degrees, and moved toward certifying practical education. In a speech in February of 2016 at a gathering of college officials in Washington, D.C., Levine said that despite the extraordinary success for more than a century of degrees and assessments, they are obsolete in the new world of work:

The United States is undergoing an economic transformation — the second in our history. This time the shift is from a national analog industrial economy to a global digital information economy. The difference between the two is this: Industrial economies focus on common processes. Time and process are fixed, outcomes are variable. In contrast, information economies focus on outcomes. Process and time are variables. In terms of education, what that means is the industrial system focuses on teaching, seat time. The information economy's system is focused on learning. Times are variable; mastery is the key. That's a revolutionary change. Of all the reforms going on in education right now, and there are a gazillion, none is larger than that or has greater implications.

When it comes to credentialing, the years ahead are likely to be chaotic, similar to the institutional debates of 1850s that resulted in the cohesiveness of the post-Civil War era. What is clear right now is that across industries and geographic areas credentials are becoming more important even as the U.S. lags behind in degree production. Many jobs that in the past didn't require a college degree — positions like dental hygienists, cargo agents, clerks, and claims adjusters — are increasingly requiring one. More than one in five clerical and sales workers today have a college degree. Ten percent of service workers have one, as do one in 20 laborers.

When Burning Glass scanned more than 20 million online job openings in 2015, it found that 56 percent of advertisements listed a bachelor's degree either as a required or preferred qualification; another 21 percent asked for a graduate degree. Those figures represent

a significant gap between what employers are looking for and what the U.S. population is able to provide to the work force: 33 percent of Americans age 25 and older have a bachelor's degree (another 12 percent have an advanced degree).

The issue is whether in the absence of degrees, employers will begin to look at other signals that someone is job-ready. This question has mystified economists and sociologists alike for some time: Is the increase in the credentialism driven by colleges and a desire for more students, or is it led by employers and a hope for better qualified workers? "There is little consensus about why employers assign

What is clear right now is that across industries and geographic areas credentials are becoming more important even as the U.S. lags behind in degree production.

jobs on the basis of the educational credentials of job candidates," wrote David Bills, a professor at the University of Iowa, in a study of credentialism.

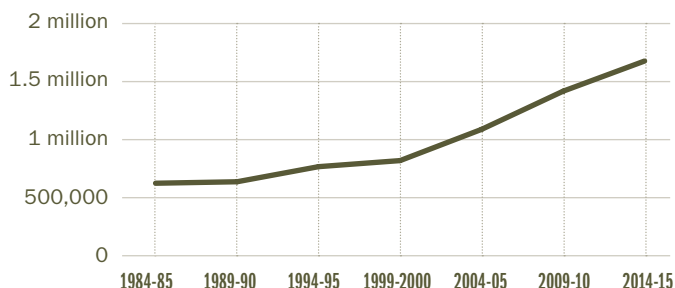
No matter why such high importance is placed on educational credentials in the hiring process, employers remain the critical player in the setting of academic qualifications for jobs. Without a credentialing system that is understandable, trustworthy, and verifiable, employers will continue to rely on the markers they have historically used. So whatever system of credentialing emerges in this fourth era, it needs to measure and communicate what employers need and the economy demands, as the next section will explore.

ASSOCIATE DEGREES

More people are earning associate degrees and short-term certificates.

American universities conferred nearly as many associate degrees and short-term certificates as bachelor degrees in 2014-15. And 10 times as many certificates with a completion time of less than a year were earned in 2014-15 compared with three decades prior.

The popularity of associate degrees and short-term certificates has grown

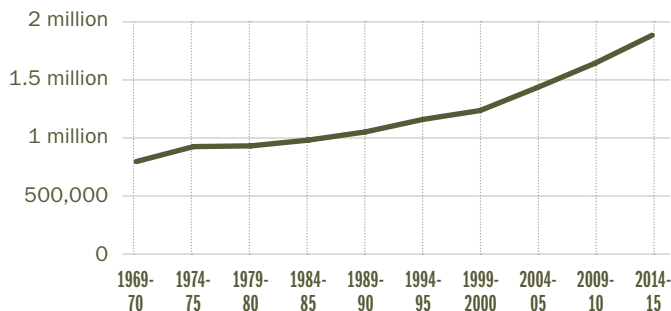


BACHELOR'S DEGREES

In the 80s, America changed who earned bachelor's degrees, and how.

As second-wave feminism came to an end in the 1980s, women began to earn a greater share of bachelor's degrees compared with men. The decade also marked a drastic rise in popularity for the bachelor's business degree.

Bachelor's degrees were conferred at a faster rate after 2000

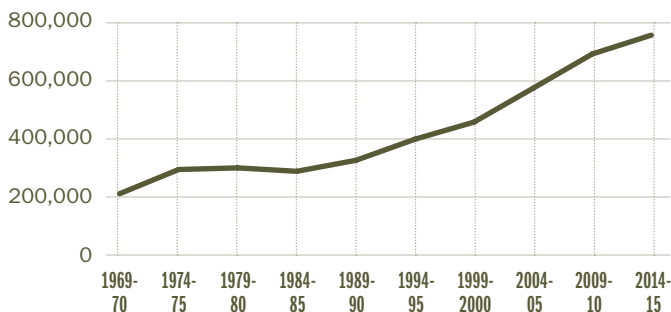


MASTER'S DEGREES

After sustained growth, the number of M.B.A.s earned peaked.

The turn of the century marks a period of increasing importance of the master's degree in varying professions. But while the number of business master's degrees earned remains substantial, the popularity of the M.B.A. has faltered in this most recent decade.

America has nearly quadrupled master's degrees earned since 1970

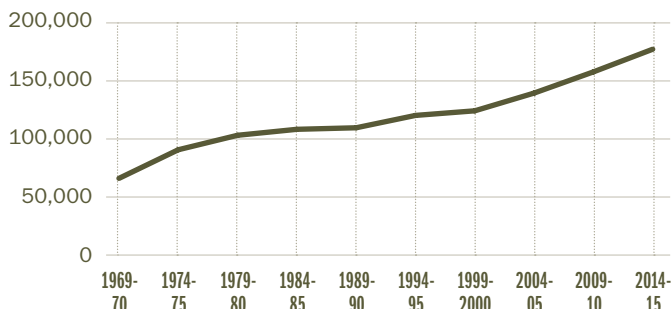


DOCTORAL DEGREES

Growth continues despite stagnant market for M.D.s and J.D.s.

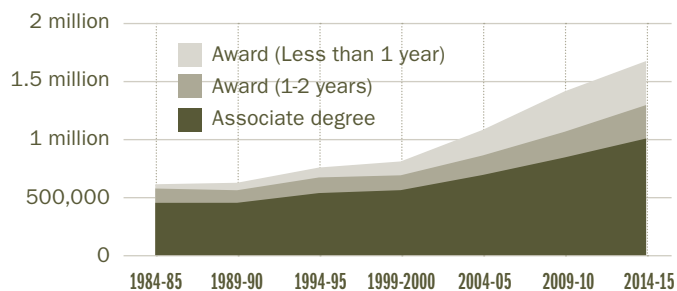
Professional doctorates remain an important element of the higher-education landscape. But despite population growth and increasing need, the number of M.D.s and J.D.s conferred by American universities has remained stagnant since 1980.

Doctoral-degree growth stalled in the 1980s, then rebounded in the the 2000s

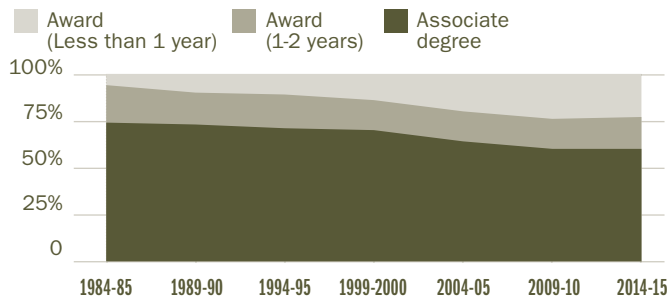


NOTE: Due to a change in classification by the U.S. Department of Education, a 5,000-degree discrepancy may exist between master's and doctor's degrees, and figures published in certain years. Data through 1994-95 are for institutions of higher education, while later data are for degree-granting institutions. Degree-granting institutions grant associate or higher degrees and participate in Title IV federal financial-aid programs.

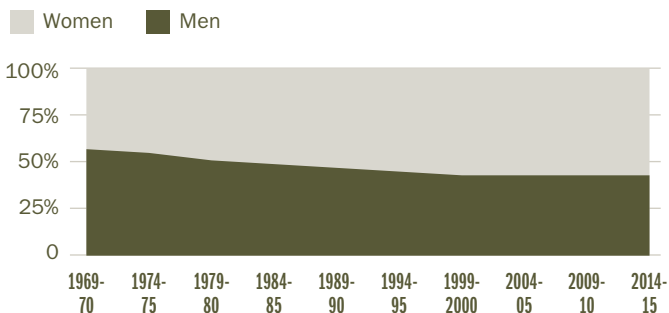
All levels of these credentials have seen increased growth



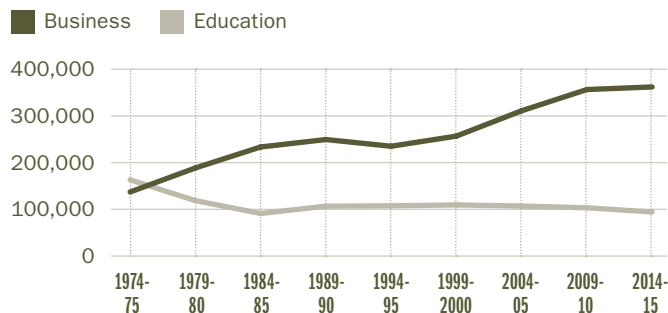
Certificates earned in less than a year are making up a greater share



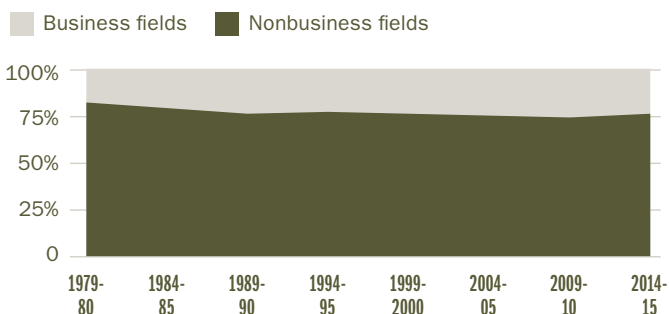
Women began earning more bachelor's degrees than men in the early 1980s



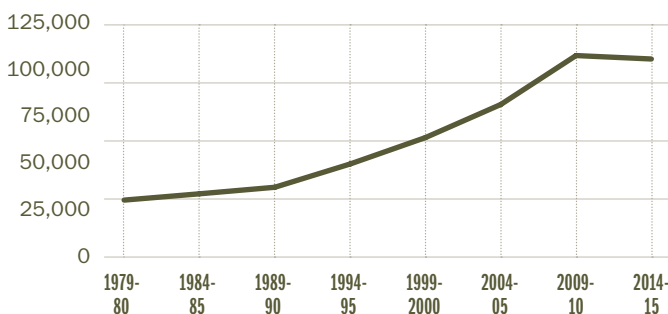
At one time, education degrees were more popular than business degrees



A quarter of the master's degrees earned in 2014-15 were in business



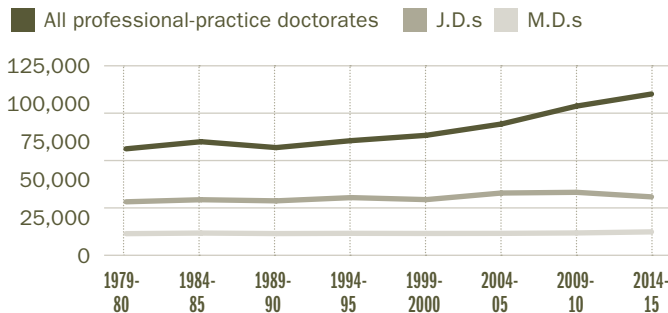
After a drastic rise, the number of M.B.A.s earned has plateaued



In 2014, six in 10 doctorates earned were in professional practice



M.D.s and J.D.s are not driving doctoral-degree growth



SOURCE: U.S. Department of Education, National Center for Education Statistics, Higher Education General Information Survey (HEGIS) and Integrated Postsecondary Education Data System (IPEDS)

SECTION 2



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A Degree's Ultimate Value

Vanguard is one of the fastest growing mutual-fund companies in the world, with \$4.2 trillion in assets and nearly 15,000 employees spread across three corporate campuses in Arizona, North Carolina, and Pennsylvania. To keep up with its breakneck pace of growth, the company hires some 1,000 newly minted college graduates every year.

That task falls to Karen M. Fox, who heads up Vanguard's university and recruiting partnerships. Until the 1990s, Fox's job didn't exist: There was no campus recruiting strategy at Vanguard. Its recruiters went to a few college career fairs near its sprawling suburban-Philadelphia headquarters, but otherwise waited for cover letters and résumés to appear in response to job ads.

Now, Vanguard's hiring process for college students is a year-round activity. "There's a war for talent," Fox said, "and we're trying to

assess whether someone has a broader range of skills and capabilities than just a piece of paper from a college and what's listed in a few lines on their résumé."

Like many large companies, Vanguard has identified a group of "core schools" its recruiters travel to each year. They decide on which colleges to visit based on where they have found success in the past — usually defined by the numbers of students who accepted job offers, their performance on the job, the campus location, academic rankings, and the salary requirements of its students. Putting together the list is more art than science at most companies. Vanguard, for example, favors larger campuses for the diversity of their student bodies and focuses on what Fox described as "mid-tier" colleges where students have "grit and a roll-up-your-sleeves mentality that comes through on the job."

Two primary and longstanding indicators embedded within the college credential — academic majors and grades — have grown less significant to Vanguard and many other companies over the years, according to surveys of employers by the National Association of Colleges and Employers, the Association

of American Colleges and Universities, and Gallup, among others. At Vanguard, what a degree is in matters only for specific jobs, such as finance or information technology. The company is not alone in disregarding one of the primary messages communicated by a degree — what a person studied for four years. At Michigan State University, Procter & Gamble hired graduates from 86 different majors in 2016, reflecting both the churn of knowledge required for its ever-changing lines of business and its eagerness to hedge its bets to find the right match.

Grades also no longer play the role in hiring they once did. Transcripts are rarely requested by employers, although employers will often still ask about them during the interview process. What was seen as a surprise announcement by Google several years ago that it would no longer consider grades in hiring is now a common practice among recruiters: Better performance in college in the form of higher grades doesn't measure on-the-job success. "It is remarkable how many published studies report no relationship between grades and job performance," Peter Cappelli, a professor at the Wharton School, observed in *Change* magazine. "There is something relevant and important about college performance," he added, "but grades simply do not proxy it well."

Indeed, while employers agree widely that what happens during a college education is crucial to success in the workplace, they often don't know exactly what those activities are until they see an employee in action. "Nothing in the science of selection," Cappelli has written, "beats observing actual performance in an equivalent role." That's why internships now play an outsized role in recruiting full-time employees right out of college. Employers today go on to hire about 50 percent of their interns as full-time workers, according to the Collegiate Employment Research Institute at Michigan State. And the share is growing every year in industries like construction, consulting, accounting, and scientific services. Postings for internships now make up a significant proportion of the overall entry-level job openings in engineering, graphic design, communications, marketing, and information technology, according to Burning Glass.

Theories abound among recruiters about

What this means for college credentials is that the economic theories that have reinforced the value of the degree in the minds of the public since at least the 1970s might no longer apply.

what proxies aside from grades they can use to find the jobs skills ultimately tested by internships. Vanguard, for instance, combs application materials for sustained and deep involvement in campus clubs, athletic teams, and community service — endeavors that tend to develop the soft skills employers want, such as teamwork, communications skills, and problem solving. But what recruiters value differs from company to company, and the hiring process is remarkably casual in nature, making it nearly impossible for colleges to systematize the development of soft skills into an established curriculum and incorporate it into the credential.

One hope is that advancements in people analytics may better measure exactly what activities inside and outside the classroom during an undergraduate career lead to success on the job. Then the race will be among colleges to create common reference points to define those skills in terms of their existing degrees or other credentials not yet imagined. "The expectation of employers will be that credentials need to both verify skills *and* quantify them," said Nina J. Morel, dean of the College of Professional Studies at Lipscomb University, in Nashville, which has developed digital badges to demonstrate the employment competencies of its graduates. "No longer will

colleges be able to tell employers that the diploma is the only confirmation that a student learned something.”

As the skills and competencies needed to keep up in almost any career spiral ever higher in a digital economy, college degrees at all levels in their analog, static form simply can’t keep up. As a result, the disconnect between what employers want and what the degree communicates will grow ever wider and fracture a principle that has sustained the business model of higher education for more than three decades: the sheepskin effect.

When Credentials Matter

The term “sheepskin effect” was first coined in a seminal 1987 economics paper by Thomas Hungerford and Gary Solon. The pair of economists found that the number of years a person studied didn’t matter in the economic value of education; it’s the degree — or sheepskin, since diplomas were once written on sheepskin — that created the payoff for the study. Subsequent research on the sheepskin effect a decade later revealed that the impact of the degree is largely confined to the years immediately after college. “As the worker has greater labor market experience, employers will come to know more about the actual productivity of the worker or will have stronger signals on which to base hiring or compensation decisions,” according to a follow-up study published in 1997.

That finding seems to confirm what employers are increasingly discovering in their own hiring practices: The degree matters only when they lack other strong signals, such as job experience or performance in the same role. It’s why employers more often now request a degree *and* experience even for entry-level jobs — a classic Catch-22 for new graduates who can’t get work experience unless someone is willing to be their first employer.

What this means for college credentials is that the economic theories that have reinforced the value of the degree in the minds of the public since at least the 1970s might no longer apply. Four key reasons employers use educational credentials in hiring are beginning to show their age in a wave of economic turmoil.

The first is the hypothesis that the credential is a signal of job readiness. In an era when more adults have degrees and there is growing distrust about the skills they actually communicate, the signal of the credential may only matter when it emanates from strong brand-name colleges. The affiliations of job applicants — where they went to school, where they interned or worked previously, or the power of their network — heavily influence whether they make it into the interview room in the first place, according to research by Lauren A. Rivera, a professor at Northwestern University’s Kellogg School of Management. Rivera embedded herself in the hiring process of some of the highest-paying entry-level jobs for two years and found that the sheen of a diploma from a top college boosted even poor applicants.

Second, degrees have historically been a convenient screening mechanism for em-

Degrees have historically been a convenient screening mechanism for employers, but nowadays companies often face a deluge of résumés from recent graduates because of the ease of searching for and applying for jobs online.

ployers, but nowadays companies often face a deluge of résumés from recent graduates because of the ease of searching for and ap-

plying for jobs online. So the degree itself is no longer a useful sorting tool. In the “vast online jobs marketplace ... restless applicants shoot off their résumés like one of those T-shirt cannons at a football stadium, firing without aiming,” the founder of a public-relations firm lamented in a recent *New York Times* op-ed headlined “How Not to Get a Job.”

Third is the idea that higher education provides the cultural capital needed to succeed on the job. A growing body of evidence indicates that students are graduating without the soft skills necessary for the modern workplace. One data point is from Burning Glass. In scanning more than 20 million job advertisements, it identified 25 core job skills, at least one of which appeared in three out of every four, no matter the industry. Virtually every job posting included in its top five requirements communication abilities, organizational skills, problem solving, planning, and detail-oriented capabilities — all skills that employers once assumed came with the degree.

Finally, the most popular belief about the value of the degree in hiring is the human-capital theory. Economists have maintained since the 1970s that the college degree is prized by employers because the formal training offered by higher education improves the productivity of individuals. But there is little clarity among employers about what new college graduates actually know.

Even degrees with the same name are not created equal. While the bachelor’s degree is a common label in higher education, there is little in common in the experiences of students who earn the credential within an institution or even within the same majors across institutions. An engineering student might need 100 credits to complete a major, while a history major might need only half that many. Marketing majors have different requirements depending on the institution, although each of the colleges may confer the same degree.

Undergraduate course catalogs have ballooned in recent decades, and the core curriculum has given way to distribution requirements that have resulted in “menu-driven sprawl,” in the words of some faculty members, allowing students to take many different pathways to a degree. While students prefer choices in the curriculum, the end degree be-

comes a fuzzy signal for employers who don’t understand exactly what’s in the box they are buying.

That’s why reputation plays such a large role in hiring. As Sean R. Gallagher points out in his book *The Future of University Credentials*, “the substance and details behind a degree are certainly routinely difficult to assess, making strong reputation/known brands powerful” within the higher-education ecosystem. “Buyers of talent have imperfect information on job seekers,” Gallagher writes, “making the reputation of an awarding institution a useful indicator of potential performance.”

The Degree as an Indicator of Learning

It’s not only external factors about the value of a college degree that are driving the conversation about the future of credentials. On campuses nationwide, faculty members and college leaders are searching to answer one of higher education’s most pressing questions: What do students really learn in college, and how do we communicate that to the wider world?

“We don’t know what is really the secret ingredient of a college education. We don’t know the essence,” said Elizabeth Capaldi

A growing body of evidence indicates that students are graduating without the soft skills necessary for the modern workplace.

Phillips, the former provost at the University of Florida and Arizona State University. “So that’s why there is fear with messing with cre-

dentials. We don't want to screw up what has seemed to work for so long."

Yet the perceived value of higher-education credentials in the past is changing in today's fickle job market. Colleges are increasingly being asked by outside entities to better measure the value of their degrees, right down to the granular level of the individual major. Seven states — Arkansas, Colorado, Minnesota, Tennessee, Texas, Virginia, and Washington — now match statewide earnings data from unemployment-insurance records with graduates from higher-education institutions within the states. They then use that data to develop interactive tools to allow anyone to better compare the outcomes of different degrees from various colleges throughout a state. And new college rankings released in recent years from *The Economist*, *Money* magazine, and the *Wall Street Journal* rank institutions based partly on the economic returns of their degrees.

The results show that degrees at the same education level deliver disparate results. Lifetime earnings between bachelor-degree recipients can vary greatly depending on major. During the course of their careers, graduates with the highest-paying major (petroleum engineering) earn \$3.4 million more than those with the lowest-paying major (early childhood education), according to Georgetown's Center on Education and the Workforce. Among the 25 highest-paying majors, all but two (economics and business economics) are in the STEM fields (science, technology, engineering, and math). Even so, the broad trends tend to miss the earnings variations within majors. The top quarter of earners who majored in humanities or the liberal arts, for instance, make more than the bottom quarter of engineering majors.

Measuring the success of the current scheme of credentials in terms of early-career earnings, though not without challenges, is much easier than measuring student learning contained within degrees. Still, phrases like "learning outcomes" have become buzzwords on campuses in recent years as colleges try to get a better handle on what a credential actually communicates to the wider world. The hope among college officials is that in the long run they can provide more value to a degree, and perhaps reduce its overall price, by focusing solely on the components of the

campus experience that contributes to student learning. Several efforts underway are pursuing that elusive goal:

- The Measuring College Learning Project, a faculty-led effort at dozens of colleges and universities, attempts to define the

Credentials in the future will need to measure and communicate the learning that takes place outside the classroom, specifically in experiences such as internships or undergraduate research.

core ideas and fundamental practices underpinning biology, business, communications, economics, history, and sociology, which collectively account for more than 35 percent of American bachelor's degrees. Overseen by the Social Science Research Council, groups of faculty members have met for more than two years to identify essential concepts (complex ideas, theoretical understandings, and ways of thinking central to each discipline) and essential competencies (such as arguing from evidence or evaluating the quality of data).

- Northeastern University has started a new program called SAIL — Student Assessed Integrated Learning — to better help students transfer their learning from one context (the classroom) to another (the workplace). Beginning just before freshman year, the program provides a technology platform for students to align their learning experiences across school and work. It breaks the experiences into five pillars: intellectual, civic, wellness, global, and professional. By tracking their progress, students can visualize what they have done in all

Continued on Page 31

TREND ANALYSIS

Are M.B.A.s and Professional Master's Degrees Still a Growth Market?

Until the 1970s, the master's degree was an academic backwater in much of higher education. With notable exceptions in fields such as education, the degree was seen as a rest stop on the way to a Ph.D. or as a consolation prize for those who fell short of a doctorate.

But as the bachelor's degree became more ubiquitous in the job market in the 1980s and 1990s, enrollment in master's-degree programs surged. It started first with the master's in business administration (M.B.A.) as institutions added full-time degrees, as well as a host of part-time, online, and executive programs to attract busy professionals.

The success of the business master's led other academic disciplines to design professional master's degrees aimed not at students who wanted to go on for a doctorate, but for those who wanted to get a leg up in the job market. Soon there was an uptick in the

number of master's degrees offered in fields as diverse as computer science, journalism, engineering, and sustainability management. As enrollment of full-timers grew, institutions created part-time options, which boosted the bottom line by filling classrooms that otherwise sat empty at night, and added online programs as well.

After the 2008 recession, overall graduate-school enrollments increased across the board, as many young professionals went back to school to wait out the economic downturn. After reaching a peak in 2013, enrollment numbers started to flatten, however, and if not for an influx of international students, graduate-school enrollments would have fallen in recent years. Within specific fields, master's degrees remain popular in computer science, engineering, and the health sciences, but enrollment numbers have dropped precipitously

2.1: MASTER'S-LEVEL ENROLLMENT BY BROAD FIELD AND GENDER, 2010 TO 2015

Broad Field	Average Annual Percentage Change 2014 to 2015			2010 to 2015		
	Total	Men	Women	Total	Men	Women
Total	1.2	2.0	0.7	-0.8	-0.1	-1.2
Arts and Humanities	-4.1	-6.0	-2.9	-3.0	-2.9	-3.2
Biological and Agricultural Sciences	2.5	2.8	2.3	1.3	0.8	1.8
Business	0.7	0.8	0.6	-1.0	-1.1	-0.8
Education	-1.1	-1.6	-0.9	-4.1	-4.1	-4.1
Engineering	2.9	3.2	1.7	3.8	3.2	6.2
Health Sciences	3.4	5.1	3.0	5.4	7.0	5.0
Mathematics and Computer Sciences	12.8	12.4	13.7	13.5	12.7	14.8
Physical and Earth Sciences	-1.9	-2.6	-1.1	-1.9	-1.5	-2.5
Public Administration and Services	1.7	-0.6	2.4	2.3	0.9	2.7
Social and Behavioral Sciences	-1.6	-2.5	-1.1	-1.8	-2.1	-1.7
Other Fields	4.8	6.5	3.7	-2.9	-2.0	-3.4

Note: Includes first-time enrollment in graduate-level certificate and education specialist programs.
SOURCE: CGS/GRE Survey of Graduate Enrollment and Degrees

in education as fewer students pursue teaching careers and more states eliminate automatic pay increases for teachers who acquire additional education (see Figure 2.1,2.2).

The venerable M.B.A. is also falling on hard times. Globally, 43 percent of M.B.A. programs saw their application numbers decline between 2015 and 2016, with European programs showing more staying power than U.S.-based institutions. Full-time M.B.A. programs seem to be in the most trouble, with fewer than half of business schools reporting application growth in 2016. Some business schools, including those at Wake Forest University and Simmons College, have pulled out of the full-time, on-campus M.B.A. market after years of declining applications and enrollment, and others have been cutting their tuition prices. Part-time programs are struggling as well, while a slight majority of online and executive M.B.A. programs report growth in their applications, according to an annual survey by the Graduate Management Admission Council (see Figure 2.3, 2.4).

The growth in graduate business schools is not with the traditional M.B.A., but in new special programs, such as master's degrees in data analytics, cybersecurity, actuarial

science, and supply-chain management.

More than one-fifth of prospective business students are interested exclusively in specialized master's programs, which are narrowly focused, shorter than a traditional M.B.A., and usually lead to a specific job, according to the Graduate Management Admission Council.

One reason for the slowdown in graduate enrollments might be their cost. At business schools, the employer-backed M.B.A. has gone the way of the three-martini lunch. Employers seem willing to help pay only for part-time and online programs where employees can still work while going to school, and even then, fewer than 50 percent of employers pay for more than half of the program's cost, according to surveys.

Most students in master's programs pay for them with debt. Graduate students represent just 14 percent of students in higher education, but they now account for roughly 40 percent of all student debt. The typical debt load of borrowers leaving school with a master's, medical, law, or doctoral degree jumped 43 percent between 2004 and 2012, according to a report from the think tank New America. The median debt load of graduate borrowers was \$57,600 in 2012, with some of the biggest

2.2: APPLICATIONS FOR ADMISSION TO GRADUATE SCHOOL BY BROAD FIELD AND DEGREE LEVEL, FALL 2015

Broad Field	Total	Doctoral		Master's/Other		
		Accepted applications		Total	Accepted applications	
Total	656,928	143,898	21.9%	1,518,973	731,589	48.2%
Arts and Humanities	61,093	11,581	19.0%	96,698	38,312	39.6%
Biological and Agricultural Sciences	74,506	14,681	19.7%	50,205	23,341	46.5%
Business	22,171	2,975	13.4%	245,262	118,776	48.4%
Education	28,110	11,630	41.4%	127,524	91,053	71.4%
Engineering	98,635	23,470	23.8%	222,886	89,076	40.0%
Health Sciences	73,063	17,015	23.3%	186,462	74,237	39.8%
Mathematics and Computer Sciences	51,215	13,033	25.4%	177,321	66,053	37.3%
Physical and Earth Sciences	62,839	16,002	25.5%	17,517	7,113	40.6%
Public Administration and Services	3,432	929	27.1%	67,487	42,662	63.2%
Social and Behavioral Sciences	122,702	18,088	14.7%	89,800	51,860	57.8%
Other Fields	18,201	4,717	25.9%	93,911	54,240	57.8%

Note: Includes applications to graduate-level certificate and education specialist programs. Because not all institutions responded to all items, details may not sum to totals.

SOURCE: CGS/GRE Survey of Graduate Enrollment and Degrees

increases among those pursuing master's degrees in education and the arts.

Whether working professionals will continue to pursue master's degrees at the same breakneck pace as in the last decade remains unclear. The annual freshman survey by the University of California at Los Angeles found in 2016 that 42 percent of first-year students said they planned to earn a master's — almost twice the share that said a bachelor's degree was their highest goal. Forty years ago, the same survey found that freshmen were more likely to aim for a bachelor's than a master's.

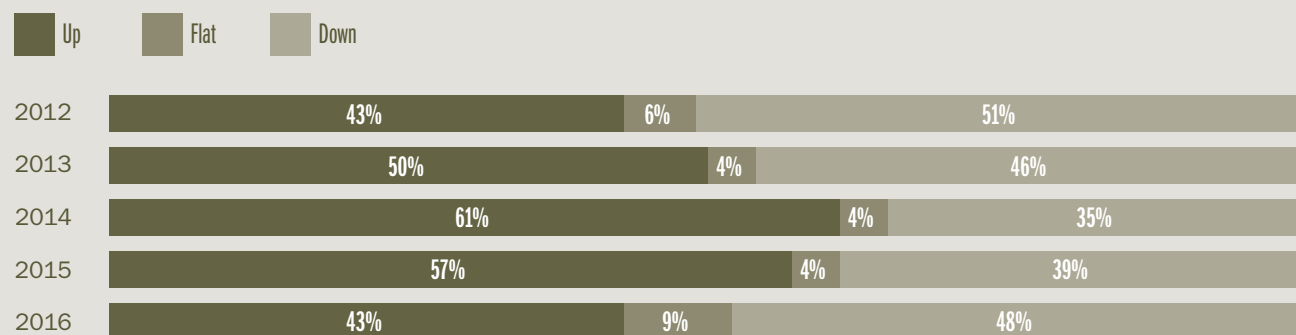
“Master's degrees have typically brought with them higher pay,” said Anthony P. Carnevale, director of Georgetown University's Center on Education and the Workforce. “The popularity of them will increasingly depend on if that return on investment for students makes sense.”

And alternatives to graduate school are proliferating in the market, including cer-

tificates from the providers of massive open online courses (MOOCs), such as Coursera and edX. Boot camps, such as General Assembly and Galvanize, which provide just enough training to get a job, are also growing in popularity. In just six years of existence, more than 340,000 students have taken individual courses at General Assembly in the cities where it operates campuses. Each class lasts anywhere from a few hours to 11 weeks and costs from \$30 to \$12,000.

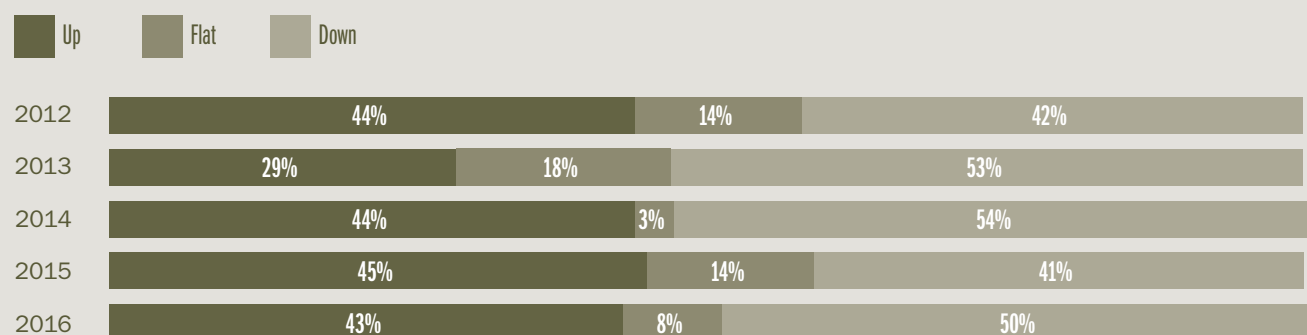
For now, the boot camps mostly focus on computer coding and data analytics for their intensive multiweek classes. None have expanded to other professional fields, and it's uncertain whether their model can be replicated in disciplines where master's degrees are not only popular with students but also recognized by employers. Whether alternative credentials like boot-camp certificates become a real substitute for traditional graduate school is largely up to employers.

2.3: CHANGE IN APPLICATION VOLUME AT FULL-TIME 2-YEAR M.B.A. PROGRAMS, 2012-16



SOURCE: Data for 2012 to 2015 are from GMAC Application Trends Surveys conducted in those years. Data from 2016 are from the 2016 GMAC Application Trends Survey.

2.4: CHANGE IN APPLICATION VOLUME AT PART-TIME M.B.A. PROGRAMS, 2012-16



Note: Percentages in some columns may not sum to 100 due to rounding.

SOURCE: Data for 2012 to 2015 are from GMAC Application Trends Surveys conducted in those years. Data from 2016 are from the 2016 GMAC Application Trends Survey.

Continued From Page 27

five areas and where they have grown, which could provide useful information for them during a job interview.

- Georgetown University is designing several curricular experiments in an off-campus innovation space called the Red House to more closely connect the informal and extra-curricular activities on campus to courses and official academic activities. Among the ideas being discussed are project-based minors that depend on students to direct their own learning; studio experiences that allow students to work with faculty members to continue projects started in classes during previous semesters; and a combined four-year bachelor's and master's degree that is an integrated experience rather than just an advanced degree bolted on to the undergraduate degree.

- Arizona State University is testing a bachelor's degree in 11 majors in which students learn nearly half of the subject matter for their academic program through a series of cohort-based projects instead of in a specified schedule of classes. Engineering students might build a robot, for example, and learn the key principles of mechanics and electronics from faculty members as needed during the project. If students are struggling with a concept, professors could pull together an impromptu class or students could learn on their own using other resources, such as free online courses offered by other colleges.

One risk in trying to better define the credentials we currently have is that colleges will end up creating a host of new ones or adding to what they already award, causing confusion in the marketplace. That's why it's unlikely any experiments from single universities will result in new credentials that will be used widely across higher education; instead any new credentials are likely to come from alliances of universities working together.

Before that happens, Matthew Pittinsky, CEO of Parchment, a credentials-management company, predicts a muddled period with a proliferation of new degrees, credentials, badges, and certificates before the system resets itself "with some level of normalization." The fact that higher education has been the beneficiary of a growing credential

society "has been a blessing and curse," he said. "The curse is that they are now expected to come to a shared understanding of how to communicate the entirety of the education experience in a way that is useful to students and employers."

The Three Key Elements of Future Credentials

Whatever develops around credentials in the coming decade, they must better equip students with collaborative, problem-solving skills to direct their own learning in a way that allows them to complement the technology that is increasingly taking over human tasks. What follows are three key elements that employers, scholars, and observers of credentials say are required in any future credential no matter its form or academic discipline.

1. The degree must signify the duality of the learning experience, both inside and outside the classroom. Historically, credentials measured the learning that happened only inside the university, specifically seat time inside a classroom. Credentials in the future will need to measure and communicate the learning that takes place outside the classroom, spe-

"We need to rely on a network of people and, increasingly, technology to store, access, and retrieve knowledge and motivate its use. The network becomes the learning."

cifically in experiences such as internships or undergraduate research.

We learn best by following our curiosi-

QUESTIONS TO CONSIDER

As colleges experiment with new ideas for credentialing, here are some key questions for officials to consider:

WHAT do employers say about your graduates and specifically the strength of their degrees? What do your graduates say? Go beyond the anecdotes and conduct comprehensive surveys.

ARE there degrees that you're offering or could offer that might provide an opportunity to incubate an idea for a new type of credential, such as badges?

HAVE you defined the outcomes of majors and individual courses within the majors? If so, is it possible to identify the competencies students could learn throughout the curriculum, whether in a fraction of a course or outside the classroom in internships or projects?

CAN you measure the experiential-learning experiences of students and incorporate them into the degree requirements and add them to the transcript?

ty and exploring and learning from peers. George Siemens, who leads the Learning Innovation and Networked Knowledge Research Lab at the University of Texas at Arlington, maintains that knowledge is not just what is in our brains, but is distributed throughout networks — both virtual and face-to-face — and that learning happens by building and navigating those networks. “Most learning needs today are becoming too complex to be addressed in our heads,” Siemens has written. “We need to rely on a network of people and, increasingly, technology to store, access, and retrieve knowledge and motivate its use. The network becomes the learning.”

2. The credential should convey an integrated experience. Colleges and universities are extraordinarily complex institutions with multiple purposes: teaching, research, preparing students for life and career, and of course, providing support services, from campus organizations to athletics to residential life. In recent years, one of the most popular theories of change in higher education has been to “unbundle” the university, both its functions and its curriculum.

The thinking goes that student services could be delivered “à la carte” so that students pay only for what they consume; for classes, courses can be delivered through a mix of

face-to-face, hybrid, and online systems from a variety of providers; and the curriculum can be unbundled too, so that students can mix and match courses as they see fit.

But a credential doesn’t signal a random collection of credits; there is a coherent curriculum behind every degree or certificate. While students are unlikely to experience all of their learning for a credential on a single campus in the future, some entity will still need to help integrate and certify the entire package of courses, internships, and badges throughout a person’s lifetime. The traditional college degree still fits that verifier role.

3. Credentials must operate with some common standard. The medium of exchange throughout higher education is the degrees conferred and the transcripts recording student progress through a course. It’s with these instruments that the activities of one institution are recognized by another. Any new credentials created in the future that aren’t recognized by a majority of institutions within the system are not considered legitimate and have essentially no value. This is why it’s unlikely that credentials created by a single institution will have any staying power in the market. For new credentials to matter in the future, institutions will need to create a common language of exchange.

SECTION 3



Kevin Van Aelst

The Lifelong Credential

Perhaps no tradition in higher education is as sacred as the pomp and circumstance of commencement. The procession, the academic robes, the speeches are interwoven with the centuries-long history of American colleges. The moment when diplomas are handed out as students walk across a stage is the culmination of years of hard work.

This iconic image of commencement won't disappear anytime soon. Still, the idea that learning is episodic and credentials are usually awarded early in life is undergoing a radical rethinking. A college degree given out at the beginning of a career fails to address how people will acquire needed skills throughout life, as workplaces evolve.

Lifelong education has become an economic necessity (see Figure 3.1). Quite simply, jobs require continuous learning, both formal and informal. And for the most part,

employers can't be counted on to provide that education. The share of U.S. workers receiving professional development from their employers has fallen steadily since 1996, according to the Council of Economic Advisers. With Americans less likely to stick with one employer for decades, the message from employers to their workers is this: You're on your own to manage your career and obtain further education. Many are doing so through MOOCs and other free education providers.

The largest generation in today's work force — millennials — seems to be getting the message. A survey by Manpower in 2016 found that 93 percent of young workers are willing to spend their own money on further training and earning additional credentials. "The purpose of credentials is changing," said J. Philipp Schmidt, director of learning innovation at the Massachusetts Institute of Technology's Media Lab. "They are moving from a sorting mechanism to a representation of a person's competency. I'm hopeful this shift will help get us to a hiring system that is less biased and less privileged to people who went to certain institutions and earned certain degrees."

This shifting system requires colleges to rethink what higher education needs to be — not a specific one-time experience but a lifelong opportunity for learners to acquire skills useful for multiple careers. In many ways, the journey to acquire higher education will never end. From the age of 18 on, adults will need to step in and out of a higher-education system that will give them the credentials for experiences that will carry currency in the job market, much like an “open-loop” system designed by Stanford University in 2014 (see Figure 3.2).

“We’re on the verge of real, radical change,” said Ryan Craig, author of *College Disrupted: The Great Unbundling of Higher Education*. “The historic relationship between higher education and the job market is changing and colleges don’t yet realize it.”

The shifting dynamics of the job market and what it requires in terms of continual learning demand that colleges consider new types of credentials. Interviews with more than a dozen people who are thinking about the future of credentials, including provosts, registrars, employers, and entrepreneurs, indicate that there are four strategies and trends likely to define the next decade:

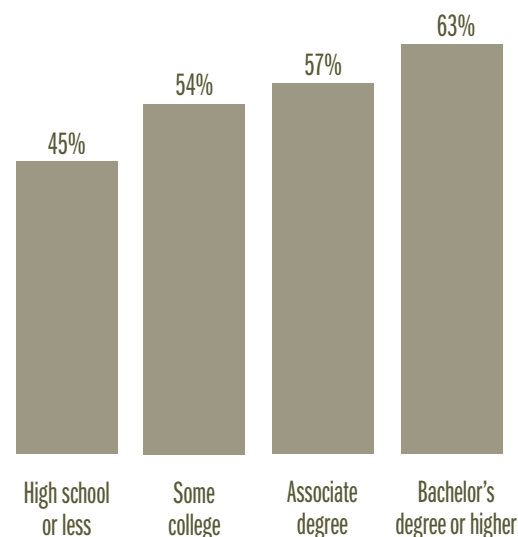
1. Instead of paper-based records warehoused by institutions, credentials will become electronic assets owned by the learner and held within a virtual and verified network.

When students complete an academic program of any kind, whether a certificate or Ph.D., they typically receive two pieces of paper: a diploma and a transcript. Those are the two assets they pay so much for and use as an admission ticket to further education or the working world.

Both are official in the minds of students and institutions, but neither piece of paper is actually owned by the learner. When applying for jobs, applicants don’t take a picture of their diploma, they just list it on their résumé. It’s up to employers to verify it through a background check. The same is true for transcripts. Graduates must request official copies from the registrar’s office, at a cost. Buying an official transcript is sometimes the only contact alumni ever have with their alma mater. The

3.1: THE NEED FOR LIFELONG LEARNING

Adults with higher levels of education are more likely to say it will be essential for them to get training and develop new skills throughout their work lives.



SOURCE: Survey of U.S. adults conducted May 25-June 29, 2016. “The State of American Jobs,” Pew Research Center

process is slow and cumbersome, which is why stories of degree fabrication are frequent.

In recent years, colleges have moved to some form of digital transcripts where they send and receive official documents online. Some two-thirds of institutions use electronic transcripts, according to the American Association of College Registrars and Admissions Officers. Still, these virtual transcripts are essentially electronic versions of paper documents — it’s like attaching a Microsoft Word document to an email. What’s more, they’re designed to be used just once by the recipient and are only as secure as the network they are sent on.

That’s about to change. Within the next decade, the technology behind digital currencies such as Bitcoin will likely transform how colleges and learners manage credentials. It’s called the “blockchain,” and in 2016 it was named one of the Top 10 Emerging Technologies by the World Economic Forum. In higher education, blockchain is developing as a way to let students, colleges, education providers,

and employers make and verify credentials on a network instantaneously without a central authority.

A blockchain is a data structure that makes it possible to create a digital ledger of transactions, such as the issuing of a certificate or a degree, and share it among a distributed network of computers, such as employers and colleges. It uses cryptography to allow each participant on the network to manipulate the ledger in a secure way without the need for a central authority. Unlike most education technology that requires a large upfront investment by institutions without a clear return on investment, blockchain requires little investment. Accessing the blockchain is like checking email where users have different clients, such as Outlook or Google.

Using blockchain technology, learners could create virtual storage boxes of their credentials and transcripts, not just those from traditional institutions but ones from all types of learning experiences. Unlike how credential transfer works now, blockchain technology makes someone's learning history available anytime, anywhere; some or all of the pieces can be shared in a verified way with col-

“The historic relationship between higher education and the job market is changing and colleges don’t yet realize it.”

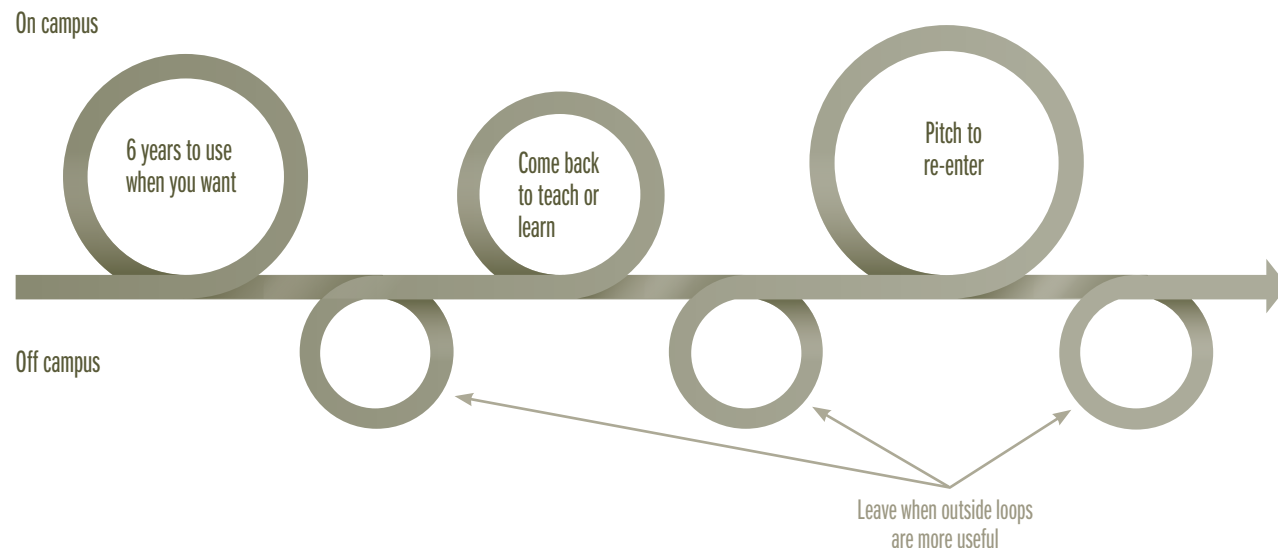
leges or employers without asking anyone or paying for them. That makes it easier and less time-consuming to create a personalized online hub to store credentials from a variety of sources and will likely accelerate the creation of so-called microcredentials.

2. In addition to traditional degrees, colleges will award new kinds of microcre-

Continued on Page 40

3.2: HOW THE OPEN LOOP UNIVERSITY WORKS

In 2014, Stanford University's d.school developed a proposal for what it called an “open loop university,” which would admit students for six years of study that could be undertaken at any time in life.



Making Sense of New Credentials: MicroMasters, Badges, and Low-Cost Online Degrees

The credentials market is in a state of upheaval, with an array of colleges, private companies, and MOOCs offering new kinds. Every month it seems a new credential name is announced, and so it's difficult for college officials to make sense of the myriad of experiments happening in this area.

Here are three designs for credentials that have application at all levels of higher education:

MicroMasters

Several universities, including name-brand institutions such as the Massachusetts Institute of Technology, the University of Pennsylvania, and Boston University, have launched MicroMasters degrees through the edX platform. Under the program, anyone can take a suite of courses across a range of more than three dozen programs, including supply-chain management, entrepreneurship, and solar-energy engineering. Those who do well and pass a set of proctored exams can earn a MicroMasters, equal to somewhere between a quarter and a half of the course material of a typical master's degree. Top performers could then apply for slots in a full master's-degree program from the universities. If accepted, they would be only a semester or two away from finishing a full master's degree.

The MicroMasters also has a lower tuition rate. At MIT, for instance, the on-campus master's degree in supply-chain management costs nearly \$70,000. The MicroMasters is just \$1,350. When edX first started the degrees with MIT, officials projected they would enroll 200,000 students across all programs; within the first nine months, more than 1.3 million people signed up. More than a third of the students have a bachelor's degree, and another quarter already have a master's or professional degree.

The transferable idea: The MicroMasters turns the admissions process on its head. Students are allowed to take courses, and even get a credential, before they actually get accepted to the master's program. The admissions decision for the full-fledged master's is based on a student's actual work in lower-level courses rather than an application, transcripts, and recommendations.

Badges

A few years ago, digital badges were all the rage in higher education. The idea behind them was that they would allow people to demonstrate skills and knowledge without necessarily having a degree. Think of Boy Scout merit badges for professionals in a fast-changing job market where degrees often cannot keep pace. Badges could give recognition to, for example, informal learning that happens outside the classroom, new literacies such as aggregating information from various sources and judging its quality, digital video editing, or social-media skills.

Badges have not been widely adopted in the ways their proponents originally imagined — at least not yet. But several institutions are experimenting with badges as add-ons to degrees.

The University of California at Davis, for instance, is using badges to help explain what students learn in a new interdisciplinary major in sustainable agriculture and food systems. Eight different departments crafted the major, which involves significant experiential learning outside the classroom that is difficult to certify with traditional grades. Students design their own badges, and in doing so, take an active interest in their learning outcomes, track their progress over time, and see a more comprehensive view of their development.

Lipscomb University, in Nashville, has developed 41 digital badges in its College of Professional Studies that describe the soft

skills students have acquired, such as communicating effectively, working in teams, active listening, and drive and energy. The badges can be displayed in a student's e-portfolio or LinkedIn profile. Employers who underwrite their workers' continuing education at Lipscomb have more interest in the underlying data on students that makes up the badge than the credential itself, according to Nina J. Morel, dean of the College of Professional Studies. "Employers don't care about the badge," Morel said. "It's just the opposite of traditional undergraduate education where employers care more about the credential and not the underlying data on what students have actually learned."

The transferable idea: It's unlikely that badges are going to replace degrees anytime soon. But badges can fill a role in the chasm that often exists between new college graduates and their first jobs. Badges can certify the soft skills that often come with relevant learning experiences students have outside the classroom. Badges can also endorse what is often called "last-mile training" — the technical skills usually missing in new college graduates but competencies they can quickly learn in short classes.

Low-Cost Online Master's Degrees

When the Georgia Institute of Technology was designing its online master's in computer science in 2013, officials realized that the scale of what they were planning allowed them to offer substantially lower costs to students. Most online programs charge as much or even more than their on-campus counterparts. Georgia Tech went in the opposite direction. It charged only what it cost to deliver the product with a small margin — around \$6,600 for the degree, which on campus cost \$42,000 at the time.

Within three weeks of announcing the

program in 2014, Georgia Tech had more than 2,300 applicants, about twice as many as it typically receives for its on-campus master's. By the spring of 2017, nearly 5,000 students were enrolled in the program. Officials noticed that the students were different from what they expected — most were from the U.S. and in their mid-30s, about 10 years older than the on-campus students. "We realized we were expanding the market," said Charles Isbell, a senior associate dean at Georgia Tech's College of Computing who helped put together the program.

Students were also in some ways more engaged than the on-campus students. They organized study groups in their hometowns, they interacted with each other as well as their professors online, and they set up Facebook groups.

Researchers at Harvard University who studied the program determined that it was serving students who had few other choices for a top-notch master's degree in computer science. A study they published in 2016 concluded that this single program would alone boost annual production of computer-science master's degrees by about 8 percent.

Now Georgia Tech is expanding the range of the program and in the fall of 2017 will offer an online master's degree in analytics for less than \$10,000.

The transferable idea: Georgia Tech designed its master's program with a goal of providing the least expensive high-quality program possible. At most universities, the final price of a degree is not taken into account until after the program components are established. What Georgia Tech has shown is that cost can be considered in the initial design, and when it is, a low price doesn't cheapen the program but rather gives universities a way to differentiate themselves in a crowded marketplace.

Continued From Page 37

dentials at all levels that recognize continual learning.

If one thing has been certain in education over the last decade, it's been the explosion of knowledge: Half of what is known today was not known 10 years ago, according to the Association for Talent Development. Yet, higher-education institutions still recognize learning mainly at four degree levels — the associate, bachelor's, master's, and Ph.D. Colleges also offer certificates, but their meaning among hiring managers is sometimes muddled unless they lead to specific certification for a job.

Microcredentials — also often called badges, nanodegrees, or MicroMasters — offer the opportunity to create more efficient packages that certify learning. The foundation of traditional degrees is time spent in a seat; the *depth* of learning is equal to the time *spent* learning. While microcredentials might also be based on time (only a shorter period), they could also break the historic underpinnings of the traditional degree by defining depth of learning through competency (what the learner actually knows) instead of time.

The “dynamism of the job market,” said Matthew Sigelman, the chief executive officer of Burning Glass, increasingly demands a quick response from the education system to provide workers with desired qualifications. It's not only entire occupations and jobs that are expanding and contracting at an alarming pace in this new world of work, but the skill composition of individual jobs is also shifting quickly. Sigelman notes, for example, that data-science jobs have quadrupled in the last five years, while the number of those positions specifically requesting data-visualization skills have grown six times as fast. In other words, even the most nimble of universities can't create full-fledged degree programs flexible enough to keep up with the changing needs of some professions.

This is where microcredentials can help by packaging new knowledge with a brief shelf life into short programs that can stand on their own or as an add-on to a traditional degree (see Page 38). The major providers of massive open online courses (MOOCs) have already adopted microcredentials as a strategy for the next stage of their development. Udacity,

which won a trademark for the term “nanodegree” in 2015, has partnered with employers such as Google and Mercedes-Benz on short degrees (anywhere from six to nine months for

Even the most nimble of universities can't create full-fledged degree programs flexible enough to keep up with the changing needs of some professions.

\$200 per month). According to Udacity, more than 13,000 people enrolled in its nanodegree programs in the first year.

Traditional universities are also making a foray into the microcredential market. One effort is the University Learning Store (universitylearningstore.org), a joint project by the Georgia Institute of Technology, the University of Washington, the University of California's campuses in Davis, Irvine, and Los Angeles, and the University of Wisconsin. The store offers online content in practical subjects, such as communications, negotiation, and project management. Learners pay anywhere from \$50 to \$150 for the courses, and when they complete an assessment, they receive a printable certificate or digital badge.

For microcredentials to gain widespread adoption and acceptance in higher education, two developments are necessary. First, employers must recognize them as legitimate. If employers are involved in creation of the credentials, hiring organizations of all kinds are more likely to recognize the new credentials much as they do degrees. Second, as credentials are sliced into smaller pieces that provide evidence of incremental

advances in skills, they must be able to stack on one another much like Legos, so that eventually the individual pieces add up to something more, potentially even traditional degrees.

3. Rather than existing as a single document, credentials will be conveyed with portfolios of assets and data from learners demonstrating what they know.

The idea of a student portfolio is nothing new. For more than a decade, campuses have both encouraged and sometimes required students to develop dossiers that showcase writing samples, class presentations, and evidence of other skills that might be attractive to potential employers. Technology has allowed portfolios to be web-based, and their adoption has taken off in recent years. More than half of students now use an e-portfolio, up from less than 10 percent in 2010, according to Educause.

But for all of the hype within higher education, employers still greet portfolios with a yawn. A headline from *The Wall Street Journal* in 2014 captures the mood of recruiters: Giant Résumés Fail to Impress Employers. Hiring managers barely have time to review short résumés; so they are unlikely to look at something that requires even more of their time. In addition, the applicant tracking systems that big employers use to initially scan résumés can't be easily reprogrammed to mine portfolios.

New technology tools are trying to solve those issues by helping employers make more sense of what's inside student portfolios. One is Portfolium, which allows employers to search and filter the experiences and competencies housed in student portfolios at more than 2,500 institutions, much as they might search for keywords in a résumé. LinkedIn has also encouraged more college students to complete their online profiles and add samples of their work to allow employers to search for talent on campuses rather than wait for students to apply for jobs.

By connecting learning across time, academic disciplines, and different environments, e-portfolios can help develop the mind-set for continual learning. If e-portfolios eventually gain widespread adoption

among employers, they could be a linchpin in the development of a lifelong-learning platform in higher education. There is no reason e-portfolios need to be confined to a student's undergraduate years, for instance, or include only work completed in the context of schooling. They can become life portfolios where individuals add work samples at any time, allowing employers and education providers to search the portfolios when hiring or to recommend skills training for career advancement. Rather than relying on the summative achievements that a credential signals, employers will be able to see the incremental advances of students through portfolios, lending credibility to microcredentials. The key element driving much of this change in the hiring market and higher education? Big data and predictive analytics.

4. The growing use of data in hiring decisions could diminish the importance of the degree but enhance specific learning experiences within higher education.

The use of so-called people analytics by employers is poised to transform what college

By connecting learning across time, academic disciplines, and different environments, e-portfolios can help develop the mind-set for continual learning.

credentials communicate in the future job market. Right now, the use of data in hiring is mostly limited to large firms and competi-

QUESTIONS TO CONSIDER

As colleges develop strategies for the future of credentials, here are some key questions for officials to consider:

HOW can you create a more flexible undergraduate and graduate experience, with more on- and off-ramps for students?

WHAT are your curricular strengths around which to create lifelong experiences?

WHAT would it take to build an e-portfolio system that allows you and your students to track and document their learning in college and throughout life?

HAVE your largest employers deployed people analytics? If so, what are they finding about the experiences beyond the degree itself that matter to success in their organizations?

tive industries where there is a war for talent — technology, banking, and professional services (law firms and management consultants). But big employers in other industries, such as JetBlue and Walmart, are beginning to embrace it as well, to help sift through a high volume of applicants and reduce turnover among current employees.

People analytics works differently depending on the company, but the theory behind it is the same one that drives the invisible array of algorithms that recommend music on Spotify and books on Amazon. How companies are shifting their hiring practices in response to what they are learning about their most successful employees provides a roadmap to higher-education institutions as they figure out whether they need to realign their academic programs for a changing workplace.

Credit Suisse, for instance, studied its hiring successes to determine whether certain experiences in a student's background could better predict success at the company. A data team looked at dozens of variables on résumés and asked a series of questions: Do athletes

outperform nonathletes? (They don't.) Does evidence of accomplishment in music matter? (It doesn't among undergraduates, but sustained accomplishment among graduate students does.) Foreign-language competency? (Doesn't help.) Some of the answers led to changes in Credit Suisse's screening and interviewing process. For example, historically the bank had emphasized quantitative reasoning in hiring given the number of calculations young bankers do every day. It tended to favor applicants with high GMAT scores, SAT math scores, and college grade-point averages. But the data team discovered that attributes such as leadership counted for much more than expected, and the bank developed new scoring guidelines that emphasized leadership positions acquired through skill or dedication, such as being captain of a varsity athletic team.

The wider use of people analytics won't eliminate the need for the college credentials. What it will do is focus employers, and thus colleges, on the experiences most necessary for success on the job and perhaps bring more clarity to an often chaotic hiring process.

The Path Forward

As the global economy demands more skills and competencies for individuals to keep up with an ever-expanding base of knowledge, we're in the midst of a race to provide trusted documentation of abilities. For generations, higher education had no trouble winning that trust among employers to provide verified evidence. After all, many colleges and universities had centuries of experience and name recognition behind them.

That trust is deteriorating, however, in some degrees and some colleges as employers question the readiness of graduates to navigate the modern workplace and economy. In response, an array of private companies, industry groups, and colleges themselves have begun to offer new types of credentials: badges, nanodegrees, microdegrees, and stackable credentials.

The credential market had been stable for a long time with easily recognized names, such as the bachelor's and master's, and an academic taxonomy understood by those responsible for hiring. But the recent explosion in credentials has caused chaos in recruiting and academic circles. What do these new credentials mean? How do they prove that students have learned something? And most of all, who gets to decide? On that last question, the answer has almost always been colleges, self-governed by their own missions, faculty, and academic standards.

Right now, there is confusion in the credentials marketplace. The value of credentials depends on uniformity, or else the creation

of them to certify learning looks more like a prescription for hyperinflation. Ultimately, that will erode trust in them. As college leaders attempt to make sense of the environment for credentials there is likely to be much more turbulence in the years ahead. Some experiments with new credentials are bound to fail, and the cluster of new players offering to verify learning is likely to undergo some contraction.

Even so, there is little doubt that the strong signal the college degree has long provided in the job market will experience significant change in the decade to come. This report lays out several approaches to how higher-education officials and employers can be better prepared for what is to come.

First, institutions must reconsider what demonstrates learning — is it mastery of a concept or time spent in a seat? Right now, seat time is the coin of the realm of the degree. That means, however, that relevant learning experiences outside the classroom — service learning, undergraduate research, and internships — often don't contribute to the credits that add up to the degree. Institutions need to identify the competencies students should learn throughout the curriculum, whether in a fraction of a course or outside the walls of the campus, and build them into the degree.

Second, colleges need to think of their curriculum not as a fixed object, but rather as smaller slices that provide evidence of incremental advances in skills. This is not a new concept in higher education. The associate degree and the master's degree got their start as stopping points on the way to a bachelor's and

a doctorate, respectively. Learning happens all the time now, not just at one time within the confines of a curriculum. And it often happens at the learner's own initiative. The Khan Academy serves some 14 million users a month with thousands of online videos.

Coursera has 22 million registered users. Even on YouTube, users viewed more than 100 million hours of "how to" video in the first six months of 2015, according to Google. Colleges need to prepare for how to certify learning that occurs anytime, anywhere.

Third, learning is now lifelong. The skills needed to keep up in any career are moving too quickly for education one time in a person's life to be enough. Even the pace of professional-development programs that give employees access to episodic moments of learning (once a year or once every few years) is not enough. Colleges need to build platforms for learning that happens outside the confines of traditional degree programs. Institutions must allow graduates to easily re-enter at periods throughout their lifetime for additional education, skills training, and yes, some sort of certification. Right now, institutions think of this as continuing education and offer a bounty of degree and certificate programs. But in this new economy, those programs are often too much of a commitment — in terms of time and money. Providing lifelong learning at the individual course level, rather than the bundled program level or offering lower-cost options, much like the Georgia Tech online master's degree in computer science, are ways to deal with these problems.

Finally, credentials are moving from pieces of paper transferred in elaborate ceremonies into bits of data and information about learning held in electronic repositories. At the same time, hiring is increasingly moving from a casual encounter to a science based on performance data. As companies and organizations figure out what makes their best employees thrive, they will look to hire more people like them. That will require employers to see more than just the name of a college and degree on a résumé. Credentials are increasingly becoming part of larger electronic portfolios of information about a person, whether in proprietary software or on networking platforms, like LinkedIn. Blockchain technology holds the promise to help higher education and employers trust the information on learning and put it in the hands of the individual rather than the institution. Blockchain is a confusing technology, but college leaders would be best served not to isolate solutions on this front to the IT department but to make such innovations part of an institution-wide strategy to better communicate what students have learned in college.

Since the birth of the modern higher-education system in the years after World War II, colleges and universities have had a monopoly on credentials. What is clear in the credential craze of recent years is that colleges are no longer the only gatekeepers proving someone's worth in the job market. The years ahead promise to bring more change to the credential market, and it will be up to colleges to prove their own value.

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