MILLER CENTER
UNIVERSITY of VIRGINIA

Transformations Affecting Postsecondary Education

Prepared for the

National Commission on Financing 21st Century Higher Education

By: Jeffrey J. Selingo, Arizona State University and Georgia Institute of Technology

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Letter from the Commissioners

The University of Virginia Miller Center created the National Commission on Financing 21st Century Higher Education in 2014 to recommend policy and funding changes to help the nation attain the goal of 60 percent of the labor force with a postsecondary degree or certificate by 2025. This means that 62 million Americans must graduate with a postsecondary degree or credential between 2015 and 2025. At current rates, the United States will produce only 39 million such graduates, leaving a gap of 23 million—a shortfall of more than 2 million per year.

To meet the goal, the nation must maintain high school graduation and college entrance rates at or above 75 percent and 70 percent, respectively—reachable goals close to historical norms. The nation must also *increase* college graduation rates from 40 percent to 60 percent. Increasing the college graduation rate is inherently challenging but made even more so because of major demographic changes. Many of the upcoming college-aged individuals will be people of color or from low-income families, populations that traditionally have needed additional counseling, mentoring, academic support, and financial assistance to successfully enter into and complete higher education. How to increase access and graduation rates and thus equality for these two population groups is the major focus of the commission.

The need to address these issues is also urgent given that other nations are catching up to—and even surpassing—the United States in postsecondary degree- and credential-attainment rates. The United States ranked 13th relative to other Organization for Economic Cooperation and Development countries in 2014 in the percentage of 25- to 34-year-olds with higher education degrees or credentials. The cost of failure in attaining this goal—to the nation in terms of international leadership and to citizens in terms of job creation and income—is too high, and so action is required now.

To learn more about these issues, the commission engaged highly qualified experts to create 10 white papers on different dimensions of the higher education problem. The commission asked all the authors to push the limits of their knowledge and engage in "blue sky" thinking on individual topics. Each paper represents the views of the individual authors, not the commission. Nevertheless, the papers provide a foundation for the recommendations in the final report. In addition, the commission hopes the papers stimulate further discussion and debate about higher education policy and funding.

The 10 papers and the final report focus on answering three primary questions related to reaching the 60 percent goal. First, how do we realign incentives and retarget existing public funding to make the entire system more efficient and to increase graduation rates for students generally and students of color and from low-income families in particular? Second, what are the new, innovative models to deliver postsecondary education that can both lower the cost and increase the productivity of the entire system? Third, what options do federal and state governments and the private sector have for increasing funding for higher education? It is important to stress here that the interest is in the " value proposition " that underlies these three primary questions. The" value proposition " focuses on the national imperative of building a more highly skilled and educated work force not merely a more credentialed one.

The U.S. higher education system is still the envy of the world, but it must become more affordable for the next generation. It must also become more innovative and adaptable, especially in its use of technology, and be more productive with regard to graduation rates. Finally, additional funding must be available from federal, state, and private-sector sources to reach the goal.

National Commission on Financing 21st Century Higher Education

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- Bob Graham, former governor of Florida and former U.S. senator (co-chair)
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- Edward B. Rust Jr., chairman (retired) and CEO, State Farm Insurance Company
- Lou Anna K. Simon, president, Michigan State University

White Papers written for the National Commission on Financing 21st Century Higher Education

Paper 1. **Crowded Out: The Outlook for State Higher Education Spending**
Authors: Dan White and Sarah Crane, Moody's Analytics

Paper 2. **Transformations Affecting Postsecondary Education**
Author: Jeffrey J. Selingo, Arizona State University and Georgia Institute of Technology

Paper 3. **State Higher Education Finance: Best Practices**
Authors: Martha Snyder, Brian Fox, and Cristen Moore, HCM Strategists

Paper 4. **Financing American Higher Education in the 21st Century: What Can the United States Learn From Other Countries?**
Author: D. Bruce Johnstone, professor, Higher and Comparative Education Emeritus, University at Buffalo

Paper 5. **State Strategies for Leveraging Employer Investments in Postsecondary Education**
Authors: Robert Sheets and Stephen Crawford, George Washington Institute of Public Policy, The George Washington University

Paper 6. **Understanding State and Local Higher Education Resources**
Authors: Sandy Baum and Kim S. Rueben, Urban Institute

Paper 7. **New Directions in Private Financing**
Author: Andrew P. Kelly, American Enterprise Institute

Paper 8. **Higher Education: Social Impact Bonds and Income Share Agreements**
Author: Carlo Salerno, higher education economist/analyst

Paper 9. **State Support for Higher Education: How Changing the Distribution of Funds Could Improve College Completion Rates**
Author: Bridget Terry Long, Harvard Graduate School of Education

Paper 10. **The Federal Role in Financing 21st-Century Higher Education: Effectiveness, Issues, and Alternatives**
Author: Gabriel R. Serna, Virginia Polytechnic Institute and State University

Acknowledgments

The members of the commission wish to acknowledge the many people and organizations involved in executing this project.

Gratitude is extended to Kristin Conklin, a founding partner of HCM Strategists, LLC, who was invaluable in determining the scope of the 10 white papers, and the most appropriate authors. She and HCM's Brian Fox are thanked for contributing to the final report as well as reviewing and commenting on several of the white papers. A special thanks goes to John Thomasian, chief author of the final report, who also provided valued guidance throughout the project. In addition, thanks go to Gretchen Cheney for ensuring that deadlines were met and that papers were edited and published in a timely fashion. Tess Moore, our staff–commission liaison, is thanked for her work in keeping the project moving forward and keeping the commissions informed.

I also wish to thank Jeff Chidester, director of policy programs at the Miller Center, for his assistance throughout the project. Appreciation goes to Erika Fitzpatrick with Church Street Editorial for editing all of the papers and to Sue Overton with Skyline Graphics who designed the various reports. Finally, I want to thank Lumina Foundation for funding the commission's work and for offering the valuable guidance of Sean Tierney, strategy officer and Kevin Corcoran, strategy director.

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Executive Summary

The moment is ripe for change in higher education. A combination of economic, state, family financial status, and demographic forces is finally forcing institutions to think differently about their future. At the same time, discoveries in the science of learning are prompting institutions to experiment with how they provide education and measure learning among a new generation of students, both traditional and nontraditional.

What is likely to emerge from these experiments and innovations over the next decade is not a single approach but rather a variety of pathways that students will follow to personalize their learning over their lifetimes. Postsecondary education in the future will be a platform for lifelong learning, with undergraduate education simply its starting point.

This new "learning network" will allow people to navigate education over their working lives. Many of the building blocks of this network already exist: competency-based education, online education, personalized learning, boot camps, and microcredentials. This new network will create many more on- and off-ramps to higher education than we have today, and because this network would focus less on the accumulation of credits to measure learning, students could more easily move between colleges, universities, and other educational providers and take breaks on their journey to gain work experience without being considered "college dropouts."

To succeed in the long run, the innovations sweeping higher education need the encouragement and support of state policymakers on several fronts:

- A move away from a view of higher education that is institution specific and largely focused on traditional 18-year-old students and bundled degrees
- Government aid structures that effectively reinforce existing systems and protect incumbent players
- The promotion of alliances and other collaborative efforts among institutions and new providers to improve quality and ensure a steady flow of students for decades to come

Introduction

The troubling signs in American higher education began appearing gradually near the beginning of the 21st century. As state appropriations to public colleges eroded, tuitions shot up. Students covered the difference with loans, pushing overall debt figures to levels never before seen. Similarly, institutions turned to borrowing to finance the growing gap between their revenue and their lofty ambitions to attract students with state-of-the-art facilities and top-notch academic programs.

No single moment in the past 15 years indicates where the tide turned for colleges and universities, but the Great Recession of 2008 and the lackluster recovery that followed accelerated trends that were already headed in the wrong direction. The economic downturn came just as institutions were experiencing a demographic shift, with a steep drop in the number of affluent, well-prepared high school graduates who had propelled the enrollment growth of the previous two decades.

The financial problems now facing higher education are most pronounced at public colleges and universities, which enroll 80 percent of American students. Students at public colleges paid about one-third of the cost of their education in 2001. Today, they are on a pace to pay for most of it—and in half the states, they already do.[1]

Debt has become the primary way students (and their parents) have made their college plans possible. In 2004, Americans owed nearly $250 billion in student loans; within eight years, that number passed the $1 trillion mark. Twenty years ago, most students were able to go to college without taking out loans; in 2012, 71 percent of students graduated with debt averaging close to $30,000.[2] Approximately 50 million Americans now hold some kind of student loan—slightly more than the number of people on Medicare and almost as many as receive Social Security benefits.[3]

Approximately 50 million Americans now hold some kind of student loan—slightly more than the number of people on Medicare and almost as many as receive Social Security benefits.

In addition, the debt that colleges and universities have taken on has nearly doubled since 2000, to more than $300 billion.[4] Debt is fine as long as institutions have the funds to pay it off, but Moody's Investors Service reports that *net tuition revenue*—that is, the cash colleges have left after disbursing financial aid to students—is essentially flat or declining at three-fourths of public colleges and three-fifths of private colleges.[5]

Nearly 10 years after the onset of the Great Recession, the harsh economic realities it exposed for higher education show few signs of improving. At the state and federal government level, so-called "entitlement" spending is projected to continue to grow and crowd out discretionary programs, including higher education. For the institutions themselves, other pressing issues point to persistent problems in the years ahead:

- **Affordability.** The cost of college tuition is on track to take up an even larger share of the family paycheck, even if institutions hold their prices close to the rate of inflation—an increasingly difficult task given the state and federal budget situation outlined above. The share of students able to pay ever-increasing tuition prices is quickly shrinking, and it's not going to get better in the next decade. Of the 450 counties in the United States that have significantly more younger than older children, all but 100 of them have median incomes *below* the national average.[6]
- **Demographics.** Children under 18 years of age, who accounted for 36 percent of the U.S. population at the end of the baby boom, today make up just 24 percent. By 2050, they will be 21 percent of the country.[7]

Today's college students are not a homogenous group, yet they are largely served by traditional institutions that offer a one-size-fits-all experience no matter the student's mindset or motivation for earning a credential.

As a result, institutions can no longer afford to ignore the needs of students outside the traditional groups they have been comfortable serving—largely white, from middle and upper incomes, and academically well prepared. Approximately 2.2 million people under 30 years of age have earned at least half the credits they need for a bachelor's degree but have no credentials to show for their classroom work. That age cohort represents the largest slice of the population by far who have that many credits but no degree.[8]

Today's college students are not a homogenous group, yet they are largely served by traditional institutions that offer a one-size-fits-all experience no matter the student's mindset or motivation for earning a credential. The dominant model of American higher education is still fundamentally rooted in the 19th century, when far fewer people needed a postsecondary credential and when the foundation of a degree was built around measuring learning as a unit of time—three hours a week in a classroom over a 15-week semester yielded three credits; 120 credits equaled a bachelor's degree.

Even as the American higher education system has expanded substantially in the last half century in the diversity of both its institutions its students, the time-based foundation has remained. Without significantly increasing the proportion of Americans who have high-quality degrees, certificates, and other credentials to 60 percent by 2025—a goal the Lumina Foundation set—institutions will produce millions fewer degrees than the U.S. economy needs.[9]

The moment is ripe for change in higher education. The combination of economic, state, family financial status, and demographic forces outlined above is finally forcing institutions to think differently about their future. At the same time, discoveries in the science of learning, inspired in part by new technology and fueled by hundreds of millions of venture capital dollars, are prompting institutions to experiment with how they provide education and measure learning among a new generation of students, both traditional and nontraditional.

What is likely to emerge from these experiments and innovations over the next decade is not a single approach but rather a variety of pathways that students will follow to personalize their learning over their lifetime. No longer will we consider postsecondary education an experience that begins at age 18 and ends a few years later.

Instead, postsecondary education in the future will become a platform for lifelong learning, with undergraduate education simply its starting point. More education will be delivered "just in time" throughout our lives instead of "just one time" near the beginning of our lives, and that education will be offered by a wider array of providers, including the traditional colleges we have today and emerging organizations that offer short- and long-form courses.

Think of what will emerge in the coming decades as a new learning network that students will navigate over their working lives. Many of the building blocks of this network already exist, and the next section of this paper explores how they can be part of reimagining the model of higher education for the 21st century.

Section 1: Reimagining the Model

To begin reimagining the future of higher education, we must reconsider its basic organizing infrastructure: the credit hour. Since its creation a century ago, the credit hour has remained the currency of the American higher-education system. The credit underlies everything associated with academics on a college campus, from faculty workloads to student eligibility for federal financial aid.

Eventually, credits add up to buy a credential at graduation. Classes that do not carry credit are useless to students if what they desire is a degree, but credits demonstrate little about what a student has learned or the skills he or she mastered beyond the fact that that student had the discipline to sit in a classroom for a semester and complete a battery of assignments. That is why most employers do not ask for a transcript as part of a job application. Perhaps most important to this discussion about the future, credits as a currency are traded and accepted by only a small slice of the learning network that is emerging in the shadows of the American higher education system.

When the nonprofit Carnegie Foundation for the Advancement of Teaching established the concept of the credit hour in the early 1900s, its purpose was to determine who would be eligible for a new pension system for professors (thus, the shorthand for the credit hour that is still used; the *Carnegie unit*). 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 its discussion of the new unit in its 1906 annual report, writing that "the fundamental criterion [in counting credit hours] was the amount of time spent on a subject, not the results attained."[10]

In the decades that followed, criticism of the credit hour as a central organizing feature of higher education intensified as the American system grew in size and diversity. In recent years, the Carnegie unit has often been seen as a barrier to change on campuses. Even the Carnegie Foundation itself concluded in a 2015 report that "American education's reliance on the Carnegie Unit is indeed an impediment to some of the solutions sought by today's reformers."[11]

A credit system based on seat time was adequate when there were few alternatives to face-to-face classroom learning, when most college students were 18–22-year-olds who had plenty of time on their hands, when the price tag of a degree was much lower than it is today, and when the rigor of courses was trusted to be the guarantee of student learning. None of those principles holds true today, yet most traditional nonprofit colleges still require students to stick around for a certain number of semesters, even if they have already mastered the material in an academic program.

There are exceptions, however, and increasingly the idea of *competency-based education,* which decouples student learning from time spent in a seat, is quickly gaining traction as a strategy for shortening the time to degree completion, lowering costs, and better demonstrating knowledge.

Competency-based education

Competency-based education allows students to move at their own pace, showcasing what they know instead of simply sitting in a classroom for a specified time period. The concept dates back to the 1970s, but until recently it was seen as a fringe idea adopted by nontraditional universities, such as Western Governors University.[12] Western Governors University, which was founded in 1997 by 20 governors frustrated with the status quo, took nearly four years to attract its first 1,000 students. Within a decade, it had 40,000 students, and today it enrolls more than 60,000.[13]

Attitudes about competency-based education are beginning to change, in large part because brand-name universities, including the University of Wisconsin, Northern Arizona University, and Southern New Hampshire University, have rolled out their own self-paced degree programs in recent years. Indeed, the landscape is shifting so quickly that it is difficult to pin down the number of institutions offering competency-based degrees or those with plans to start such programs, with some estimates as low as 50 and others as high as 350.[14]

Competency-based education offers both students and institutions opportunities to save money. It allows colleges and universities to unbundle different functions now wrapped up in the job of full-time faculty members. "The cost of the faculty is a major one at a traditional university, and competency-based education shifts the paradigm about how faculty are used," says Fred Hurst, Northern Arizona University's senior vice president for extended campuses.[15]

Competency-based degree programs operate in slightly different ways, but in general, full-time faculty members design the learning outcomes and the assessments needed for the students to prove their competency. The bulk of the interaction with students—and thus the financial savings for institutions—is undertaken by an army of part-time coaches and evaluators who are experts in their field and hired when enrollment demands them.

Those cost savings are passed on to the students in the form of lower tuitions. Northern Arizona University and many other competency-based programs operate a so-called "all-you-can-eat" pricing model: Students are charged a flat fee for all the courses they can take in a specific time period. At Northern Arizona University, that fee is $2,500 every six months for the three bachelor's degree programs it offers. The university anticipates that the average student will finish the program in 3.5 years, for a total price of just $17,500 (compared to about $40,000 in tuition alone for an in-state student completing a normal four-year degree program).[16]

Despite the substantial savings, college officials still need to sell the idea to students who have grown accustomed to the cadence of time-based education. When Southern New Hampshire University started its competency-based program in 2013, it approached employers to sell the idea as a benefit for their workers rather than marketing directly to individual students. "The employers got it," says Paul LeBlanc, the university's president. "No one asked us, 'Where are the courses?'"[17]

Since then, the university has forged partnerships with 100 employers around the country, including Gap, McDonald's, and Penn Medicine, and now enrolls 3,000 students. Logos of the companies at which the students work line the walls of Southern New Hampshire University's headquarters, housed in a nondescript office building on the main thoroughfare in Manchester, New Hampshire, several miles from the main campus of 3,800 traditional undergraduates.[18] Not only is the operation run from an off-campus site, it even has its own name: College for America. That's all by design, LeBlanc says. He wanted College for America to be free of a campus culture that tends to be risk averse. "Moving them off campus allows them to think differently," LeBlanc says.[19]

Only 40 percent of full-time students enrolling for the first time at a four-year institution graduate in four years. Even when that timeframe is extended to six years, the number improves only to 60 percent.

Like other competency-based programs, the average student in College for America is a working adult. Early results about the academic progress of students in College for America are encouraging. Southern New Hampshire University used the Education Testing Service to assess the learning and skills of the students in College for America in areas typically emphasized in general education courses. Its students scored in the 67th percentile on the Proficiency Profile, which measures critical thinking, reading, writing, and mathematics skills.[20]

College for America is also the first competency-based program to receive approval by the U.S. Department of Education for direct-assessment degrees. Previously, competency-based programs translated competencies into credits so that students could qualify for federal financial aid. Other programs have since followed College for America in applying to the Department of Education for approval for direct assessment, a key hurdle to breaking the stranglehold that the credit hour has on colleges and universities and allowing for a new system in which the currency of higher education is what a student has learned, not credit for showing up.

Personalized assistance powered by student data

If we expect students to navigate a postsecondary education system that offers a variety of pathways to a credential, then they will need better guidance to arrive there. Already, too many students get derailed before graduation. Some never even make it to campus after being admitted because they are tripped up by complicated financial aid forms or face unexpected expenses; others start college but drop out before they earn a degree.[21]

Only 40 percent of full-time students enrolling for the first time at a four-year institution graduate in four years. Even when that timeframe is extended to six years, the number improves only to 60 percent.[22] Students who attend a two-year college fare even worse. Although 80 percent of community college students say that they plan to transfer to a four-year institution, only about 25 percent do, and only 17 percent actually earn a bachelor's degree within six years.[23]

Traditional advising structures at most universities were designed for the much smaller and better-prepared slice of students who enrolled 40 years ago. Those structures, which rely on faculty or professional advisers, no longer work for the student body many universities now serve. One in 10 students never even meets with an academic counselor before graduation according to the National Survey of Student Engagement, an annual poll of freshmen and seniors, and only 4 of 10 students consider counselors their primary source of advice regarding academic plans. Students may treat advising as an afterthought, but the cost of acting on bad advice can be considerable.

Of particular concern are low-income and first-generation students. Children from families that earn more than $90,000 have a 1 in 2 chance of getting a bachelor's degree by age 24: That change falls to 1 in 17 for those students from families that earn less than $35,000.[24] Many low-income and first-generation students end up overwhelmed by the size and complexity of public institutions and do not want to ask or know where to go for help.

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By collecting and analyzing data about student performance, a handful of universities have developed tools to track patterns that allow for more personalized advising and course delivery. This approach to using information collected in the normal course of daily life is similar to how corporate America mines data about its customers to better appeal to their buying habits. In the case of higher education, data analytics allows institutions such as Arizona State University, Virginia Commonwealth University, and Austin Peay State University in Tennessee to predict outcomes for students in particular courses or majors based on the performance of similar students in the past.

The science behind these advising systems is the same one that drives the invisible array of algorithms that recommend music on Spotify and movies on Netflix. Colleges know that if a student does not do well in statistics his or her freshman year, that student is not likely to finish a degree in economics. At universities that have massive course catalogs for low-income and first-generation students to negotiate, big data is an analogue to the support network that most middle- and upper-income students take for granted.

Few institutions have harnessed the power of data analytics to improve student outcomes better than Georgia State University. In 2003, the university graduated just 32 percent of its students within six years. The numbers were even worse for low-income, black, and Hispanic students.[26]

Today, Georgia State University graduates 55 percent of its students. What's more, during the past four years, Georgia State University has awarded more bachelor's degrees to black students than any other college or university in the country, and its graduation rates of low-income students now equal those of wealthier students. For every percentage point increase in retention, Georgia State University generates an extra $3 million in tuition revenue for technology that costs around $200,000 per year.

Georgia State University uses predictive analytics to improve student outcomes with the following programs:

- **Web-based advising.** The university draws from a database of 2.5 million grades over the past 10 years to show current students the classes and majors they are most likely to succeed in based on their grades in previous courses. Graduates in spring 2015 completed their degree requirements with six fewer credit hours, on average, compared to seniors two years prior.
- **Major Matcher.** This tool reviews a student's course grades and, using historical Georgia State University data, suggests majors in which the student is most likely to succeed. As a result, the number of students undecided about their major at the end of their first year has gone down 40 percent in the past two years. Since this system was put in place, the university's fastest-growing majors are biology and computer science, historically majors that had high dropout rates. "We are now more systematically giving students a fighting chance to succeed in these majors by offering entering diagnostics and early interventions," such as tutoring, says Timothy M. Renick, Georgia State University's vice provost.
- **Peer tutoring.** The university looked at the biggest courses that had the highest number of Ds, Fs, and withdrawals in various departments. Then, it found the students who performed well in those classes and were on financial aid and awarded them work–study dollars to serve as peer tutors in the semester after they had completed the course. The average course grade for those students who attended at least three tutoring sessions during a course was almost half a letter grade higher than for those who did not attend.
- **Retention grants.** Georgia State University has used data analytics to better target its limited financial aid budget. It scours the list of students who have unpaid bills at the beginning of each academic year for those who owe small amounts of money, are close to graduation, and have good grades, rewarding them with retention grants to keep them in school.

Other institutions already have most of the data in house that Georgia State University uses—mounds of data stored in legacy computer systems across campus just waiting to be mined. Using these data to help students navigate an increasingly complicated and meandering path to a credential is critical.

Indeed, there is compelling evidence that big data could help low-income and first-generation students at the beginning of the college process, as well, preventing the "under-match" when students enroll in institutions that are not well aligned to their academic credentials and filling the gap in the summer between the end of high school and the beginning college, when students no longer have ties to high school guidance counselors or access to their college advisers.[27]

Technology has rapidly transformed nearly every industry. Although colleges have spent millions to outfit campuses with wireless technology, purchase the latest in computing power, and hire information technology staff, technology has largely failed to improve quality, bring greater efficiency, or lower costs—until now. Decades after the personal computer arrived on college campuses, the promise of technology to lower costs and improve learning is finally closer to reality.

Online instruction

Nowhere has the power of technology to transform higher education been trumpeted more than in relation to online courses. For much of its existence, however, online education has suffered from an image problem. When online education was first introduced in the 1990s, it was seen as a cheap knockoff of on-campus offerings, much like the correspondence courses of previous decades. Its growth during the first decade of the new millennium coincided with the expansion of for-profit universities, two trends often conflated by the media and the general public. As a result, the quality concerns that frequently dogged the for-profit industry rubbed off on online education. By 2011, in a survey by the Pew Research Center, only 29 percent of American adults said that online courses held equal value to learning in traditional classrooms.[28]

Think of that era as *online instruction 1.0*. In recent years, three major trends have helped improve the quality of online instruction and its reputation and use by a broader array of institutions and students: the Open Learning Initiative, hybrid courses, and massive open online courses (MOOCs).

The Open Learning Initiative

The first development was the growth of Carnegie Mellon University's Open Learning Initiative, which was launched in 2002. That effort has used the latest research on how people learn to design two dozen courses in statistics, biology, and other core subjects instead of relying solely on the intuition of professors. The results of the program are virtual simulations, labs, and tutorials that provide immediate feedback to students and information to faculty members to help them spend their face-to-face time with students in the most productive way. With the financial backing of charitable foundations, Carnegie Mellon University provides the courses free to more than 100 colleges.

Hybrid courses

The second development was the concept of combining the best of classroom instruction with the latest developments in technology to create hybrid courses. Referred to by many names—*flipping the classroom, hybrid, blended learning*—the approach breaks down the silos that exist on many campuses between online education and face-to-face learning. Now, students are amassing information outside of class largely through online materials, and class time is spent processing that information and working through problems with the professor or other students. In 2013, William G. Bowen, an economist and former president of Princeton University, published a study that compared the learning outcomes of two randomly assigned groups of students: one that took a hybrid course and one that took a traditional face-to-face course.[29] At the end of the course, he and his coauthors found no significant differences between the groups' learning outcomes; indeed, the students in the hybrid course took about a quarter less time to learn just as effectively. Bowen, who had been a skeptic of online education, wrote afterwards, "I am today a convert. I have come to believe that now is the time."[30]

Massive open online courses

The third development in this new era was MOOCs. When a few professors at Stanford University put their courses online for free in 2012 and tens of thousands of students signed up, they changed the image of online education. Soon, dozens of elite colleges and universities, followed by new entities such as edX and Coursera, began offering free online courses, and hundreds of thousands of students enrolled. Some students had bachelor's degrees; others had Ph.D.s., Master of Business Administration degrees, or other degrees. Many were taking an online course for the first time. The idea of who the online student might be shifted from a working-class high school graduate going back to school to a college-educated professional looking to gain specific knowledge to get ahead in his or her job. MOOCs did what millions of dollars in advertisements from online providers never achieved: They legitimized digital education. "Despite ample evidence that online education was comparable [to] or better than face-to-face [education], it was always seen as the cheaper way to go, of cheating your education," says George Siemens, who co-taught the first MOOC in Canada in 2008. "Once [the Massachusetts Institute of Technology] MIT and Stanford [University] dove in, it did away with those negative connotations."[31]

As we develop a model for the future of higher education, online education should not be thought of as only for students who take fully online degrees. The Sloan Consortium has found that the percentage of students taking at least one online course grew from fewer than 2 million in 2004 to 5.2 million in 2013. What's more, in 2002, 34 percent of colleges offered online courses and degrees; by 2015, that number had grown to 70 percent.[32] Too many institutions see online education as a profit center, however, and charge students the same as or more than for face-to-face courses. Only when universities are forced to pass on the savings for online education will students see its full benefits.

Although online education will continue to be a pathway in and of itself for time-pressed and place-bound students to achieve a credential, the reality is that for most students, online education will be one of several types of courses they take to reach their goal. In this way, colleges will unbundle the degree from the method of learning. It is already happening. At the University of Central Florida, the second-largest institution in the country, with more than 60,100 students, about 60 percent of the university's *residential, on-campus students* take online or hybrid courses. In any given semester, approximately 2,700 students enroll in online, hybrid, and face-to-face courses at the same time, saving valuable classroom space and time to degree completion.[33]

In addition, recent advancements in the quality of online education will increasingly allow universities to deliver learning in chunks smaller than entire courses. One of the more interesting findings from research on MOOCs is that few students completed entire courses because they were able to pick and choose from a menu of readings and videos to fill in gaps in their knowledge without attending a course for an entire semester. In other words, they were able to personalize their learning to their needs. The best online courses take advantage of how the brain actually learns, segmenting learning with constant feedback loops. For students, online learning in such short spurts provides the opportunity to master concepts as they are needed instead of studying a theory in one semester and not using it until two semesters later, by which time they have probably forgotten what they learned. Now, the challenge to higher education and policymakers is how to certify learning that does not follow the typical structure of a traditional certificate or degree.

Badges and microcredentials

The current structure of university degrees dates to colonial days. The first colleges—Harvard, the College of William & Mary, and Yale—imported much of their structure from Europe: the four-year degree; the organization of the curriculum into courses with finite time blocks; even the titles *freshman, sophomore, junior,* and *senior.*[34] That architecture has remained relatively intact for more than two centuries.

There are two fundamental flaws in the current credentialing system. First, it measures completion of a curriculum, not actual learning. Second, it is controlled by existing institutions that have a vested financial interest in determining which credits count toward a credential.

Such an arrangement, however, fails to capture the diversity of an increasingly unbundled system in which students earn credentials based on competencies, take courses in a variety of formats, or learn in shorter segments than semesters. With an education ecosystem that increasingly features "lots of on- and off-ramps," says Holly Zanville of the Lumina Foundation, "we're going to need some better structures than we have now."[35]

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With more and more students "swirling" through higher education—one-third of students change institutions at least once before they earn a bachelor's degree—a credentialing system so closely tied to the completion of a particular institution's curriculum is often problematic to the free flow of students. The credit-transfer business in higher education is arbitrary at best. A public university across the state may accept credits that a community college grants while a public university in the same town as the community college declines them. That is why students who transfer often rack up more credits than they need to graduate, which costs them time and money.

Evidence is emerging that employers are looking for alternatives to just one key attribute—the conventional college degree—when evaluating job candidates. According to a survey conducted by *The Chronicle of Higher Education* and American Public Media's *Marketplace,* a quarter of employers say that they place less value on a bachelor's degree when hiring than they did five years ago. Approximately 43 percent said that they weighed work experience over academics when it came to hiring recent graduates, and 70 percent said that they would ignore the requirement of a college degree altogether if a candidate's other characteristics were a good fit.[36]

Much like colleges that analyze data to better advise students completing their degree, companies are increasingly mining information about employee performance to find the key characteristics of their best workers. Approximately 4,500 companies have at least one employee focused on this emerging field of "people analytics," with half of those companies having created the positions after 2010.[37] Their goal: to find what makes an employee survive and thrive in the company other than a degree.

Badges and microcredentials better communicate what a graduate knows to employers that until now have evaluated job candidates based largely on a résumé, the name on a degree, and a transcript that is nearly impossible to translate.

The question is whether there are other markers to success that employers will come to trust. One promising effort gaining traction is the idea of microcredentials and badges that measure actual learning, usually in shorter periods of time than two or four years, and offer proof about students' specific skill sets.

Think of these microcredentials as Boy Scout merit badges in a fast-changing job market in which degrees often cannot keep pace. Badges recognize, for example, informal learning that takes place outside the classroom—so-called "soft skills," such as critical thinking and communication; new literacies, such as aggregating information from various sources and judging its quality; and digital video editing or social media skills. The badge includes links back to documents and other artifacts demonstrating the work that led to earning the stamp of approval. Most important, the emerging badge systems are open, meaning that they are not controlled solely by colleges and universities but rather include contributions from employers, governments, and civic groups.

Badges and microcredentials better communicate what a graduate knows to employers that until now have evaluated job candidates based largely on a résumé, the name on a degree, and a transcript that is nearly impossible to translate. That was the goal behind a badging system launched by the University of California (UC), Davis, in 2013, after officials there concluded that a conventional degree would not properly explain what students learned in a new, interdisciplinary major in sustainable agriculture and food systems.[38]

Eight different departments crafted the major, which involves significant experiential learning outside the classroom that is difficult to quantify with traditional grades, says Joanna Normoyle, former experiential and digital media learning coordinator at the university's Agricultural Sustainability Institute, who helped build the badging system. Badges, Normoyle says, "provide context to grades and a few lines on a résumé. They tell a story about the experiences of a student."

At UC Davis, students design their own badges, and in doing so, they take an active interest in their learning outcomes, track their progress over time, and get a more comprehensive view of their development. Such a student-centered approach to learning is critical in an economy that is changing at a rapid pace. Education, out of necessity, is becoming a lifelong pursuit.

In a hyperconnected, wireless, mobile world, learning happens everywhere at any time. Students need to navigate this new learning economy largely on their own, having completed what is still considered "formal schooling." We can't expect to go to college at age 18, graduate at age 22, then remain employed for the next 40 or more years with that foundation of knowledge alone. Microcredentials and badges will not only fill in information about skills learned in college that are not communicated by a traditional diploma, but this new crop of credentials can also be stacked on top of that conventional degree as working adults "upskill" throughout their careers.

Lifelong learning

The average age of financial independence for today's college graduates is 30. That's when they reach the median wage in the United States. In the early 1980s, college graduates reached that mark by age 26,[39] but now, the on-ramp from education to full-time work is delayed for many young adults, and our work lives are shifting as life expectancy increases.

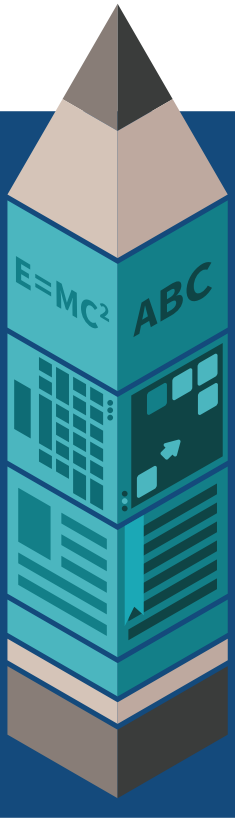
Some young adults are using their 20s to test careers and occupations by job shopping. Economists have found that increased mobility in a person's 20s leads to higher earnings later in life, when people are less able to move or cannot easily abandon the skills they have learned.[40] Others are investing in their human capital through additional education, although not necessarily the route through graduate and professional schools that marked the 20s for previous generations. This generation and other working adults are looking for short-term educational opportunities that can give them specific skills to get a job or move ahead in a career—just-in-time education.

Just-in-time education is like basic training in the military in that it gives people the foundational knowledge they need to get started. Everything else they will learn on the job or perhaps in another course down the road. "The real key in a world in which people are changing jobs all the time is short-term learning that is very connected to the next job you are going to get," says John Katzman, who founded *The Princeton Review.*[41]

In recent years, a new category of providers has emerged to serve this growing demand for just-in-time education: boot camps, sometimes referred to as *accelerated learning providers.* The boot camps are all different, but they have a few things in common. Their focus is on teaching skills in high demand in the job market, such as computer coding. Their curricula teach students just enough to get the job, given that the market is rapidly changing and students will need additional education anyway. In addition, practitioners who are expert in their field teach the courses. There is no tension between theory and practice in boot camps: It's all about vocational training delivered as quickly as possible. Everything in a typical undergraduate or graduate curriculum that employers see as irrelevant is discarded.

So far, their model is proving popular, particularly in the technology field. Upwards of 63 coding boot camps operate in the United States and Canada, for instance,[42] one of which is General Assembly. General Assembly has nearly two dozen locations around the world and more than 20,000 alumni who have taken its full- and part-time courses in technology, business, data, and design.[43] Most of General Assembly's students are in their 20s and 30s and already have a bachelor's degree. General Assembly says that 90 percent of its graduates find work within six months.

One other thing these boot camps have in common is that they largely serve a population of students able to pay out-of-pocket tuition that can run upwards of $12,000 for a 12-week program. Recently, the U.S. Department of Education announced that it would run an experiment to allow boot camp students to access federal student aid. Without federal and state financial aid programs, the boot camps and other just-in-time educational opportunities will largely be closed to less advantaged populations, further expanding the economic divide in higher education outlined earlier.



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Section 2: Reimagining the Model

Over the past decade, technology-enabled transformations have occurred in many sectors of the economy. The music, movie, and television industries were transformed by digital downloads, then streaming services. The book business was uprooted by ebooks and Amazon. Now, the taxi industry is undergoing massive change in many cities thanks to ride-sharing services such as Uber and Lyft.

The shifts in these sectors began on the fringes of society—think of Napster as a precursor to iTunes in the music industry. Then, the new players, such as Apple, turned into competitors or in some cases totally supplanted existing companies such as Tower Records.

The question now is whether the transformations in higher education outlined earlier will have similar consequences for colleges and universities. As mostly nonprofit, heavily regulated and subsidized enterprises, higher education institutions are somewhat immune from the larger forces facing corporate America. Still, the potential changes in how higher education will be delivered, assessed, and paid for remain significant and could have an impact on the entire U.S. system.

A future of learning pathways, with multiple on- and off-ramps

In the learning network of tomorrow that the innovations outlined earlier in this paper will enable, traditional universities will no longer have a monopoly on teaching and certification: Instead, new competitors will provide more convenient options for students at lower prices. Tension will continue to exist between traditional and nontraditional providers, but the friction in the new system is more likely to be between an integrated learning experience that leads to high-quality credentials and a disaggregated learning experience that is simply a collection of courses that provide few benefits to students.

The arc of learning over a person's lifetime is more than a collection of parts. There is a designed curriculum behind most degrees today. One risk of a learning network in which students pick and choose their educational experiences and assemble them from a variety of partners is that the sum of those experiences is a credential without meaning in the new economy. It will be critical for policymakers to ensure that the routes students follow through higher education in the future lead to gainful employment.

What might some of these high-quality pathways for students in the future look like?

The first change is how students enter postsecondary education through the **admissions process**. Right now, applying to college is a difficult and often time-consuming process, especially for low-

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income students who lack access to high-quality counseling in high school. Students either make poor choices and select schools that are a bad fit for them academically or financially or they do not go at all.

With advances in technology, the time has come to rethink whether applications are needed at all. Instead, imagine a future in which admission to a college is based on the massive amounts of data and information already collected about students from an early age rather than a snapshot made in one moment in time for an application deadline. Rather than wait for applications, colleges would be able to conduct extensive searches of data that students and parents choose to make available. In such a scenario, admissions would be more akin to how employers now recruit talent to their organizations rather than wait for an application to arrive in response to a job advertisement.

Traditional high school courses and activities would not provide the only breadcrumbs of data that colleges could scour. They might also search for prospective students among those who take massive open online courses (MOOCs). The open courses could enable colleges and universities to discover talented students participating in classes equivalent to those offered on their campuses and completing assignments their professors create. It's an easier and cheaper way to find that diamond-in-the-rough student, and it's a safer bet that these students will ultimately succeed, given that they are already doing the work.

Such a framework is already being developed with the Global Freshman Academy, a partnership between Arizona State University and edX. The academy plans to offer a dozen MOOCs free of charge and allow students to pay and apply for credit, if they so choose, only after they successfully complete the class. The approach turns the current admissions system on its head. Instead of students applying to college, being accepted, paying thousands of dollars in tuition, and only then taking classes that they might end up failing, students get to try college first, with little risk.

Once enrolled in college, students would be able to follow **personalized pathways to a credential**. If the basis of degrees in the future is competencies that students need to master instead of the time they spend in a seat, students can achieve outcomes in more ways than the one route through college most follow today. They could earn a competency in a fraction of a course or, more importantly, outside the university's walls, with jobs, internships, and research projects. By moving at their own pace, students could save money by shortening the time to a degree, or they could invest more in their human capital by adding majors and minors and achieving additional credentials for the same price they would have paid for a traditional bachelor's degree.

How and where students learn would be more flexible in the future, not just the physical classrooms they primarily sit in today at specific times during a semester. They could take classes through a mix of online, hybrid, and face-to-face courses offered by a variety of providers, allowing them to focus their efforts on how and where they learn best. Students would be guided on their personalized pathway through a mix of coaching and electronic advising, driven in part by the data collected throughout their journey. As students achieve specific outcomes, they would receive badges and microcredentials that will become part of an electronic learning portfolio that remains with them throughout their lifetime. The portfolio helps students showcase what they learned and also allows them and their employers to determine gaps in knowledge that they could fill with further education down the road.

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Finally, such a system would allow for many more on- and off-ramps to higher education than we have today. Because the system would focus less on the accumulation of credits to measure learning, students would not need to transfer credits each time they wanted to switch majors or change institutions. They could more easily move among colleges, universities, and other educational providers and take multiple breaks on their journey to gain work experience without being considered a "college dropout." This system does not come without its risks, of course. As this new learning network emerges, policymakers and college officials will need to grapple with four key questions in the years ahead:

- How do we assess quality in a highly fragmented higher education system?
- What defines student success in a system where learning never ends?
- How do students finance lifelong education with multiple providers and credentials?
- What should the new learning network's capacity be?

How do we assess quality in a highly fragmented higher education system?

Most people agree that many colleges and universities are not as good as they could or should be. As the price of higher education continues to outpace both inflation and the growth of average family incomes, students, parents, and policymakers are demanding to know just what families are getting for their money. Unfortunately, defining quality in higher education has long been a futile endeavor.

The primary mechanism for ensuring that students receive a high-quality education is the system of regional accreditors. Because higher education institutions administer that system, however, it has come under fire in recent years for keeping poor-performing schools in business. "The Watchdogs of College Education Rarely Bite" is how *The Wall Street Journal* described accreditors in a July 2015 front-page headline. The article went on to illustrate how hundreds of institutions with low graduation rates and high levels of loan defaults among their graduates continue to operate. Attempts to find reliable alternatives to accreditation at the federal level have largely failed in the current and previous presidential administrations.

Although rankings are often used as a proxy for quality, the methodology for these rankings is usually based on input measures, such as student test scores and faculty salaries, which encourage colleges to spend more to raise their profile. Recently, data on graduate outcomes—their success in the job market and their earnings—have turned into a popular consumer measure of quality, but institutions often do well in those rankings because of the majors they offer and their location near major cities.

The highly fragmented system of higher education that is emerging might not fare any better without a parallel system for ensuring quality. If there is one bright spot, however, it is that many of the innovations discussed in this paper have their own assessments already baked into their model. Competency-based degrees require specific measures of learning before students move on. Microcredentials and badges are closely tied to workforce needs, and overall, the focus on predictive analytics to track student performance will give colleges and universities more information than ever before to measure their learning outcomes.

What defines student success in a system where learning never ends?

In 2014, a group of faculty members and students at Stanford University's renowned design school released the results of a yearlong exercise to rethink what undergraduate education at the institution might be in the year 2025. One of their ideas was an "open loop university": Instead of offering undergraduates the usual four years of education, Stanford would admit students for six years of study that they could use at any time in their life. It would be university for life, with students looping in and out at their convenience.[44]

Under that scenario, however, Stanford University's official six-year graduation rate, which today stands at a near-perfect 95 percent, would plummet. Obviously, Stanford graduates would not be any less successful in an open loop university, but by one official government measure, Stanford University would be considered a failing institution because students might take decades to complete a degree. It's one reason the federal government's method of measuring a college's graduation rate—first-time, full-time students who enroll in the fall and complete their degree within 150 percent of normal time—is flawed in the new era of lifelong learning.

The federal government's view of higher education is institution specific and largely focused on traditional 18-year-old students and bundled degrees. As new providers slice credentials into smaller pieces, we clearly need new ways to measure student success.

How do students finance lifelong education with multiple providers and credentials?

Today's federal student aid system has its roots in Title IV of the Higher Education Act of 1965. Title IV is a rigid system that is unwelcoming to new players and fails to recognize the growing array of new credentials. Even periodic updates to the law over the years have failed to fully meet the needs of the changing student market, especially as states have reduced their direct investments in public institutions.

The same rigid system is largely replicated at the state level. Institutions are financed based primarily on the enrollment of traditional students rather than on student outcomes or needed credentials. Even in the handful of states where some or all appropriations are based on performance, the measure of success is typically tied to conventional degrees, not microcredentials or badges that have labor market value.

Government aid has the effect of reinforcing existing systems and protecting incumbent players. If the higher education transformations described in this paper end up lacking access to federal or state dollars, there will be little incentive for existing institutions to experiment with new delivery systems or credentials. Without federal and state support for new types of degrees over the course of a person's lifetime, such experiences are likely to remain the domain of those students who can afford them.

What should the new learning network's capacity be?

Today, there are approximately 4,700 colleges and universities in the United States. The number of institutions kept pace with growing enrollment for much of the first decade of the new millennium, but since 2010, the number of institutions has remained relatively constant, even as enrollment has fallen. The enrollment drop has been particularly sharp at institutions that have fewer than 1,000 students, which make up more than 40 percent of American colleges and universities.[45]

Many of the innovations this paper describes require either large endowments or scale, neither of which is present at most institutions. Nearly 80 percent of American colleges enroll fewer than 5,000 students.[46] In higher education, small size has always been equated with quality. The prevailing wisdom is that increased size comes at the expense of academic quality and prestige.

Innovative institutions such as the University of Central Florida and Arizona State University, however, are challenging such long-held assumptions about size and quality in an effort to give more students access to higher education. Now, states are taking notice and looking more seriously at consolidation of far-flung and underenrolled institutions. The University System of Georgia, for instance, has approved six campus mergers in recent years in an effort to free funds for student success initiatives.

In most industries, the weakest players in a sector are driven out by more efficient and less expensive options, but because they are heavily subsidized and regulated by the government, colleges rarely go under. If the states and federal government were to encourage the new delivery systems and credentials this paper outlines, more institutions would be likely to seek mergers or other collaborative efforts to improve quality and ensure a steady flow of students for decades to come.

Conclusion

The Great Recession of 2008 put a significant dent in the finances of colleges and universities and the students they serve. In the years since, the financial crisis has provoked conversations among faculty and higher education leaders on campuses nationwide about a number of issues—how to improve pedagogy through technology for a diverse student body, how to finance the growing costs and financial needs of students, and how to prepare graduates for an ever-changing economy. As a result of those conversations, several innovative ideas have taken hold, including competency-based degrees and predictive analytics, that a decade ago were just a kernel of an idea.

The question now is how to scale what works to more institutions and sustain it beyond the current fascination with transforming higher education among faculty, administrators, and policymakers. The adoption of the changes this paper describes will have significant and far-reaching consequences for higher education as we know it. The problem is that too few colleges and universities are following them and too few state policies are encouraging institutions to shift their strategies. Policies we must pursue to create the learning pathways that lead to high-quality credentials in the next decade include:

- **Building new pathways through higher education.** The solutions outlined in this paper will remain on the fringe as long as states promote the traditional route to a degree. States must incentivize institutions to partner with new providers, such as massive open online courses and boot camps, to create additional lanes to a credential, then work with schools, students, and parents to promote those new routes.
- **Allowing more flexibility with financial aid.** At the state level, higher education appropriations still flow largely to institutions, and financial aid goes to students who attend traditional colleges and universities. For the new learning network to succeed, state policymakers need to offer competitive grants to new providers, putting them on an even playing field with established institutions and allowing state financial aid to follow students who choose to carve new pathways through higher education.
- **Ensuring that the lower cost of higher education is passed along to students.** Colleges and universities are full of cross-subsidies; as a result, a bundled degree forces students to pay for courses and amenities on a traditional campus that they never use. Even as institutions experiment with new modes of delivery, such as online education, lower costs are often not passed on to students. States must provide the seed money to institutions to pilot and scale innovative solutions, but in return, colleges and universities must make commitments to pass those cost savings on over time to students through lower tuitions.

The lofty position American colleges and universities hold around the world depends on our ability to successfully navigate and integrate new developments in how education is delivered, how students are assessed, and how credentials are awarded in our treasured higher education system. At the same time, we must confront issues of quality, completion, funding, and capacity if we ever hope to meet the demands of a 21st-century economy and society.

[1] Jack Stripling and Karin Fisher, "An Era of Neglect," *The Chronicle of Higher Education* 60 no. 5 (March 7, 2014): A26–A38.

[2] Kevin Carey, *The End of College: Creating the Future of Learning and the University of Everywhere* (New York: Penguin, 2015).

[3] Jeffrey J. Selingo, *College (Un)Bound: The Future of Higher Education and What It Means for Students* (Boston: Houghton Mifflin Harcourt, 2013).

[4] Ibid.

[5] Moody's Investors Service, "Announcement: Moody's: Modest Revenue Growth Supports Stable Outlook for US Higher Education in 2016," Press Release, December 2, 2015.

[6] Sara Lipka, "Demographic Data Let Colleges Peer Into the Future," *The Chronicle of Higher Education* (January 14, 2014), http://chronicle.com/article/Demographic-Data-Let-Colleges/144101 (accessed March 22, 2016).

[7] Haven Ladd, Seth Reynolds, and Jeffrey J. Selingo, *The Differentiated University: Recognizing the Diverse Needs of Today's Students* (Boston: Parthenon, 2014).

[8] D. Shapiro et al., *Some College, No Degree: A National View of Students With Some College Enrollment, but No Completion* (Herndon, VA: National Student Clearinghouse Research Center, 2014).

[9] Anthony P. Carnevale, Nicole Smith, and Jeff Strohl, *Help Wanted: Projections of Jobs and Education Requirements Through 2018* (Washington, DC: Georgetown University Center on Education and the Workforce, 2013), https://cew.georgetown.edu/wp-content/uploads/2014/12/HelpWanted.ExecutiveSummary.pdf (accessed March 22, 2016).

[10] John Harris, "Brief History of American Academic Credit Systems: A Recipe for Incoherence in Student Learning," http://eric.ed.gov/PDFS/ED470030.pdf (accessed March 22, 2016).

[11] Elena Silva, Taylor White, and Thomas Toch, *The Carnegie Unit: A Century-Old Standard in a Changing Education Landscape* (Stanford, CA: Carnegie Foundation for the Advancement of Teaching, 2015).

[12] Dan Berrett, "How a 40-Year-Old Idea Became Higher Education's Next Big Thing," *The Chronicle of Higher Education* (October 2015), http://chronicle.com/article/How-a-40-Year-Old-Idea-Became/233976 (accessed March 22, 2016).

[13] Ibid.

[14] Robert Kelchen, *The Landscape of Competency Based Education* (Washington, DC: American Enterprise Institute, 2015); and Paul Fain, "Experimenting With Aid," *Inside Higher Ed* (July 23, 2014), https://www.insidehighered.com/news/2014/07/23/competency-based-education-gets-boost-education-department (accessed March 22, 2016).

[15] Mark Schneider and K.C. Deane, *The University Next Door: What Is a Comprehensive University, Who Does It Educate, and Can It Survive?* (New York: Teachers College Press, 2015).

[16] Unless otherwise noted, details about the programs mentioned throughout this paper are from their websites.

[17] Paul LeBlanc, interview with author, March 2015.

[18] Details about College for America are from the author's visit in November 2015.

[19] Paul LeBlanc, interview with author.

[20] Paul Fain, "Measuring Competency," *Inside Higher Ed* (November 25, 2015), https://www.insidehighered.com/news/2015/11/25/early-glimpse-student-achievement-college-america-competency-based-degree-provider (accessed March 22, 2016).

[21] For a discussion of the hurdles that face low-income students, see Lindsay C. Page and Judith Scott-Clayton, "Improving College Access in the United States: Barriers and Policy Responses," NBER Working Paper No. 21781 (Cambridge, MA: National Bureau of Education Research, 2015), http://www.nber.org/papers/w21781 (accessed March 22, 2016).

[22] National Center for Education Statistics, Institute of Education Sciences, "Table 326.10: Graduation Rates of First-Time, Full-Time Bachelor's Degree–Seeking Students at 4-Year Postsecondary Institutions," https://nces.ed.gov/programs/digest/d13/tables/dt13_326.10.asp (accessed March 22, 2016).

[23] Davis Jenkins and John Fink, "What We Know About Transfer," Community College Research Center, Teachers College, Columbia University Research Overview (January 2015), http://ccrc.tc.columbia.edu/media/k2/attachments/what-we-know-about-transfer.pdf (accessed March 22, 2016).

[24]Andrew Delbanco, *College: What It Was, Is, and Should Be* (Princeton, NJ: Princeton University Press, 2012).

[25] NSEEville State University, "NSSE 2013 Academic Advising Module," National Survey of Student Engagement, http://nsse.indiana.edu/2013_Institutional_Report/pdf/NSSE13%20Topical%20Module%20-%20Academic%20Advising%20(NSSEville%20State).pdf (accessed March 22, 2016).

[26] Timothy M Renick, Georgia State University, interview with author, October 2015.

[27] L.C. Page, "Improving College Access."

[28] Kim Parker, Amanda Lenhart, and Kathleen Moore, "The Digital Revolution and Higher Education" (Washington, DC: Pew Research Center, 2011), http://www.pewinternet.org/2011/08/28/the-digital-revolution-and-higher-education (accessed March 22, 2016).

[29] William G. Bowen et al., *Interactive Learning Online at Public Universities: Evidence From Randomized Trials*" (New York: Ithaka S+R, 2012), http://www.sr.ithaka.org/wp-content/uploads/2015/08/sr-ithaka-interactive-learning-online-at-public-universities.pdf (accessed March 22, 2016).

[30] William G. Bowen, "Lecture II: Prospects for an Online Fix: Can We Harness Technology in the Service of Our Aspirations?" (paper presented as part of the Tanner Lectures on Human Values at Stanford University, Stanford, CA, October 10–12, 2012), http://tannerlectures.utah.edu/Bowen%20Tanner%20Lecture.pdf (accessed March 22, 2016).

[31] As quoted in Jeffrey J. Selingo, *MOOC U: Who Is Getting the Most out of Online Education and Why* (New York: Simon & Schuster, 2014).

[32] I. Elaine Ellen and Jeff Seaman, *Grade Level: Tracking Online Education in the United States* (Babson Park, MA: Babson Survey Research Group, 2014), http://www.onlinelearningsurvey.com/reports/gradelevel.pdf (accessed March 22, 2016).

[33] Jeffrey J. Selingo et al., *The Next Generation University* (Washington, DC: New America, 2013), https://static.newamerica.org/attachments/2318-the-next-generation-university/Next_Generation_University_FINAL_FOR_RELEASE.8897220087ff4bd6afe8f6682594e3b0.pdf (accessed March 22, 2016).

[34] Arthur M. Cohen and Carrie B. Kisker, *The Shaping of American Higher Education: Emergence and Growth of the Contemporary System,* 2nd ed. (San Francisco, CA: Jossey-Bass, 2010).

[35] As quoted in Goldie Blumenstyk, "When a Degree Is Just the Beginning," *The Chronicle of Higher Education* (September 14, 2015), http://chronicle.com/article/When-a-Degree-Is-Just-the/232969 (accessed March 22, 2016).

[36] Karin Fischer, "The Employment Mismatch," *The Chronicle of Higher Education* (March 4, 2013), http://chronicle.com/article/The-Employment-Mismatch/137625 (accessed March 22, 2016).

[37] Lorenzo Canlas and Will Gaker, "The Analytics of People Analytics" (paper presented at the Wharton People Analytics Conference, Philadelphia, April 2015).

[38] Details about the University of California, Davis, badging system from an interview with Joanna Normoyle, September 2014, and from the program's website at http://asi.ucdavis.edu.

[39] Anthony P. Carnevale, Andrew P. Hanson, and Artem Gulish, *Failure to Launch: Structural Shift and the New Lost Generation* (Washington, DC: Georgetown Center on Education and the Workforce, 2013).

[40] Martin Gervais et al., "What Should I Be When I Grow Up? Occupations and Unemployment Over the Life Cycle," NBER Working Paper No. 20628 (Cambridge, MA: National Bureau of Education Research, 2014).

[41] John Katzman, interview by author, March 2014.

[42] Sarah Kessler, "Where Are the Women in Tech? Coding Bootcamps," *Fast Company* (August 24, 2015), http://www.fastcompany.com/3050171/the-future-of-work/where-are-the-women-in-tech-coding-bootcamps (accessed March 22, 2016).

[43] Details about General Assembly from interview with co-founder Jake Schwartz, March 2015, and from General Assembly's website at https://generalassemb.ly.

[44] Stanford2025, http://www.stanford2025.com (accessed March 22, 2016).

[45] Seth Reynolds and Jeffrey Selingo, *Strength in Numbers: Strategies for Collaborating in a New Era for Higher Education* (Boston: EY/Parthenon, in press).

[46] Ibid.