

Data, Technology, and the Great Unbundling of Higher Education

By Ryan Craig and Allison Williams

American colleges and universities continue to navigate by the stars of rankings from *U.S. News & World Report* and other sources. These rankings are primarily derived from easy-to-measure inputs such as student selectivity, faculty resources (e.g., class size and student-to-faculty ratio), spending per student, library holdings, and research productivity. Not surprisingly, the country's elite colleges and universities (those with the highest admissions standards) consistently rank at the top of these lists. The result? Andreas Schleicher, director for education and skills and special advisor on education policy to the secretary-general at the Organisation for Economic Co-operation and Development (OECD), notes: "No one in the United States tries to figure out what a great university is; they just look at the Ivy League."¹

Rankings are one of the “4 Rs” that have emerged as the dominant metrics in higher education:

- Rankings
- Research
- Real Estate
- Rah! (Sports)

All four are easy to measure and simple to communicate to alumni and other development constituencies. And all have precious little to do with student outcomes.

The result is isomorphism: American colleges and universities have acquired similar characteristics in their common pursuit of the 4 Rs. This not only has resulted in a diverse system converging toward a similar model but also has shaped that model around traits that have more to do with mimicking the trappings of the elites than with driving student outcomes. As demonstrated by a range of ailments plaguing nonelite institutions (e.g., low completion rates, lack of rigor, and a brake on social mobility), these proxies for excellence are not at all predictive of success.

This begs the question: if the 4 Rs are not predictive of performance and strong student outcomes, which metrics are? As of yet, we don’t know. But as Purdue University President Mitch Daniels has said: “Higher education has to get past the ‘take our word for it’ era. Increasingly, people aren’t.”²

Measuring Up: The Impact of Data

There is no doubt that the demand for outcomes data will cause colleges and universities to evolve. While elite institutions will continue to have lines out their doors, for the rest, which have spent decades accumulating the accoutrements of elite institutions absent the quality, the market is no longer viewing the 4 Rs as proxies of excellence.

A recent survey by Admittedly, a college admissions service, revealed that among 27 potential factors, the *U.S. News* ranking came in at #20 in terms

of importance in students’ decision-making process. Twice as many students said that rankings were “not important at all” as those who said that they were “very important.” So what *do* students care about? The top four factors were majors, cost, safety, and employment.³

Forced to demonstrate definitive value, midtier institutions will have to decide what they want to be when they grow up. If they’re in the business of providing basic degree programs—where value to the student accrues primarily as a result of the credential itself—they will become a discount provider: delivering the program as inexpensively as possible. If they can truly provide premium programs with a high return on investment, they will be able to continue to charge high tuition. What they must not do—if they want to survive—is stand still.

Hollowing Out

In retail, Sears, JCPenney, Gap, and J. Crew are teetering. The Loehmann’s department store chain, a New York institution, declared bankruptcy, sold all its stores, and is now an online retailer. Meanwhile, dollar stores everywhere are thriving. In dining, Olive Garden and Red Lobster are struggling. Foot traffic at midtier casual dining chains has dropped in every quarter except one since 2005. According to John Maxwell, head of the global retail and consumer practice at PricewaterhouseCoopers, clients are focusing on either high-end products and services or rock-bottom prices: “As a retailer or restaurant chain, if you’re not at the really high level or the low level, that’s a tough place to be. You don’t want to be stuck in the middle.”⁴ Whereas fast-food casual chains like Chipotle and Shake Shack don’t pretend to be fancy sit-down restaurants, Olive Garden and Red Lobster have the accou-

trements of high-end restaurants. The problem, of course, is quality.

We are beginning to see a similar shakeout in higher education. In a survey of 368 small private colleges and midsize state universities, 38 percent failed to meet their 2014–15 budget for both freshman enrollment and net tuition revenue. Even more shocking, approximately half of institutions that claimed to hit budget were reporting against downward-revised budget numbers.⁵ Like the retailer and restaurant markets, the middle of the higher education market is being hollowed out from both the top and

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the bottom. Currently, the vast majority of institutions are somewhere in the middle, providing mediocre returns for \$10,000–\$20,000 per year. The good news for students is that following this hollowing out, institutions will provide a higher return on investment. Whereas discounters are likely to deliver their programs primarily online, premium providers will utilize technology for some delivery but will focus on immersive, intensive, employer-focused and -facing experiences for students. In fact, it’s conceivable that the only remaining institutions with a return-on-investment profile characteristic of today’s market will be the elite colleges and universities that have set the pace for higher education until now.

The Full-Stack Model

The “full-stack” startup model describes two of the most successful public and private technology companies of our time: Apple and Uber. At the heart of this model is a comprehensive approach to controlling the user experience. Whereas Microsoft aimed to provide key elements of personal computer software via Microsoft Windows and Office, Apple took control of every element

of the value proposition to ensure a superior experience for the end user. Similarly, Uber was preceded by several companies that attempted to sell software to taxi and limousine companies to make them more efficient. But none of them took off, because none of them fundamentally improved the consumer experience. After all, even the world's best dispatching software doesn't change the fact that you're sitting in the back of a dirty cab. Uber wasn't daunted by the notion of owning the entire supply chain, thereby materially improving the end-user experience and revolutionizing the industry.

Mike Fishbein, a marketing expert and the founder of Startup College (<https://stpcollege.com/>), has discussed the application of the full-stack model to higher education. Fishbein believes that the top of the higher education stack is a job. According to Fishbein, "a full stack education company might not look like a school at all. It could look like an employer, a lender, a school, and/or a recruiter all rolled into one."⁶

Full-stack providers that hope to achieve the higher education equivalent of Apple's or Uber's success will have to find a way to do three fundamental things: (1) develop and deliver specific high-quality educational experiences that produce graduates with capabilities that specific employers desperately want; (2) work with students to solve financing problems; and (3) connect students with employers during and following the educational experience and make sure students get a job.

The growth of coding schools and bootcamps is the first sign of the emergence of the full-stack model in higher education. Providers like Galvanize (<http://www.galvanize.com>) connect students with employers and achieve near-perfect placement rates. Some coding bootcamps even guarantee employment or tuition is refunded. The bootcamp

sector is experiencing remarkable growth: one survey noted an increase from 6,740 graduates in 2014 to an expected 16,056 in 2015.⁷ At Galvanize and other coding schools, the 4 Rs are nowhere to be found.

The Promise of Technology

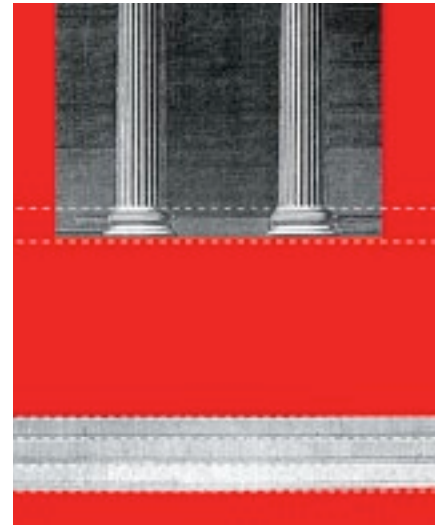
Although technology has promised transformative change for higher education since at least the 1980s, the three areas where it has the potential to make a material difference are accessibility, affordability, and efficacy.

Accessibility

The accessibility of the American higher education system is one of its hallmark strengths. Since 66 percent of high school graduates enroll immediately in postsecondary education, it's likely that the overall U.S. matriculation rate is over 70 percent—one of the highest levels of matriculation in the world.⁸ Yet before digital delivery transformed distance learning to online degrees, accessibility was not universal. It was this accessibility gap that drove the growth of University of Phoenix and DeVry campuses at highway interchanges throughout the country in the 1980s and 1990s. The emergence of online degrees was the logical conclusion of the for-profit push for accessibility. By 2005 or so, anyone with a high school diploma or GED could access college. Whether that person could afford college and whether it was of any use are different questions.

Affordability

While the *New York Times* declared 2012 to be the "Year of the MOOC,"⁹ the real higher education story of the decade is the crisis of affordability. Current and recent students amass unprecedented debt loads by the time they graduate. The average bachelor's degree recipient who has taken out student loans carries \$28,400 in debt, and 26 million consum-



ers have two or more open student loans on their credit report. Between 1999 and 2011, outstanding student loan debt grew by 511 percent; as of early 2014, it exceeded \$1 trillion, more than credit card debt.¹⁰

In 1979, a typical student could pay his/her way through college working at the minimum wage for 182 hours, the equivalent of a part-time summer job. In 2013, the same student at the same college at the present-day minimum wage would have to work over 991 hours (a full-time job for half the year) just to cover tuition while still needing to find additional resources to pay for living expenses.¹¹ In addition, the wealth gap between young and old has also never been wider. At the end of 2011, the typical U.S. household headed by a person age 65 or older had a net worth 47 times greater than a household headed by someone under 35, a number that more than doubled since 2005.¹²

While online delivery should be a solution to the crisis of affordability, in our current isomorphic system price continues to serve as a signal of quality. As a result, most institutions offering online programs have done so at the same price point as their on-ground programs; to do otherwise would send the wrong signal for a medium that is still young and thirsting for academic legitimacy.

Efficacy

Isomorphism has acted as a similar brake on the efficacy of online programs. To date, online programs have faithfully replicated the format of traditional on-ground instruction (consisting of regular lectures, discussion, and weekly assignments), failing to take advantage of a host of technology-enabled pedagogical models that offer the potential to greatly improve student outcomes.

Simplicity is a central element of good product design. No one understood this better than Steve Jobs, who was famously quoted as saying products needed to be so simple that a stoned freshman could figure them out. Years before he conceived the iPod, iPhone, and iPad, Jobs was busy designing videogames for Atari. The only instructions for the *Star Trek* game he built were: “1. Insert quarter. 2. Avoid Klingons.”¹³ Not surprisingly, his main demand of iPod, iPhone, and iPad product designers was to simplify the product: if something took more than three clicks to find, it was moved; if something didn’t make intuitive sense, it was eliminated.

If any product or service should be designed so that a stoned freshman can figure it out, it should be higher education. Despite this, higher education may be the most complex product or service purportedly designed for mass consumption. This is not a comment on the difficulty of the subject matter being taught in the classroom; rather, it is a comment on the opaque and complex process of enrolling, financing, and ultimately assembling a degree. Focus groups conducted at Macomb Community College in Michigan, offering 200 degree and certificate programs to 48,000 students, revealed that very few students were able to navigate the complexities of enrollment, financial aid, transcript requests, prior credit recognition, program selection, and course selection/scheduling.¹⁴ Because of the flawed transfer-credit system, students have difficulty identifying pathways toward a degree if they’re changing institutions—something that a large percentage of them will do over the course of their studies.

To be successful in improving outcomes, higher education must turn the current process of program design on its head. Traditional program design is based on a system of credit hour inputs rather than outcomes. This has resulted from a culture of faculty-focused curricular development, which moves from an established curriculum to assessment and then to learning outcomes. A simpler, better system would be reverse-engineered by starting with student outcomes, then moving to the assessments that prove that the outcomes have been achieved, and only then turning to the question of what curricula best prepare students for the assessments. Fortunately, technology allows higher education to make this shift.

Solving for Affordability:

Competency-Based Learning

In a decade, online education may be recognized not for making higher education accessible to anyone with a smartphone but, rather, for serving as the midwife who delivered competency-based learning into the world. Although competency-based learning is theoretically possible in a non-technology-enabled environment, it’s not nearly as simple and appealing. In a competency-based environment, transfer credits become an anachronism and failure becomes a relic. In a competency-based world, the 41 percent of students who start but don’t complete degree programs within six years will still receive value from the competencies they can show to prospective employers.¹⁵ Equally important, in our experience, competency-based learning reduces the cost of delivery by half over standard online delivery. Astute providers will pass the savings along to students and become leaders in the new discount segment.

Solving for Efficacy: Adaptive Learning and Gamification

With online learning, the “controlled focus” that a faculty member can (theoretically) exert in a classroom environment disappears. In its place, students “focus by choice.” In other words, any student studying online can change applications at any time, look away from the screen, or get up, walk away, and drop out. With today’s primitive online programs, too many do just that. Technology’s efficacy goal for online learning should be to move “focus by choice” as far as possible in the direction of “controlled focus.” Two sets of technologies will accomplish this.

The first is *adaptive learning*. In an instructor-led classroom, the instructor is capable of delivering only a single stream of instruction. Adaptive learning makes the single stream obsolete. When instruction is delivered online, there’s no reason every student shouldn’t have an individualized stream that progresses at the optimal rate and in its own order. Adaptive learning typically accompanies competency-based learning, but it is distinct. Combining adaptive learning with competency-based learning is the “killer app” of online education. Students will progress at their own pace. When they excel on formative assessments

integrated into the curricula, they are served up more-challenging learning objects. And when students struggle, adaptive systems throttle back until the student is ready for more.

The second technology is *gamification*. This could prove to be the most transformative of the lot; imagine the

impact of making education nearly as addictive as slot machines. In slots and videogames, goals are clear, and feedback is immediate. Focus is the result of interactivity and competition. If you’ve ever tried to pry someone away from a

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game console or a slot machine, you've witnessed the power of gamification. Successful next-generation online learning models will employ rewards and recognition to propel students onto the next unit without regard to their ability to stay focused on the long-term goal of earning a degree.

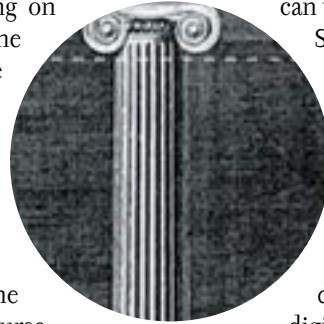
The Smartphone Challenge

Smartphones have become the global gateway to all things digital: 2.6 billion people currently have smartphones; in five years, the number is expected to be 6.1 billion, or 70 percent of the world's population.¹⁶ Other digital devices are destined to become increasingly peripheral as society becomes more and more accustomed to the smaller screen. Like other mature sectors of the online economy (e.g., advertising), higher education must deal with the impact of this transition.

At present, however, there's a trade-off between accessibility and efficacy. With today's technology, the holy trinity of online learning—lecture, discussion, weekly assignment—fails to translate to a mobile platform. First, navigating curriculum is challenging on a smartphone. Smartphone users are much more likely than PC users to abandon content that takes more than five seconds to load, creating a fundamental barrier to delivering engaging content over the duration of an entire course. Second, although discussion boards can work well on smartphones, mobile discussion is not without its challenges. For one thing, smartphone posts are likely to be much shorter and more informal than what faculty are accus-

tomed to. Third, formative assessments work very well on smartphones both in a classroom environment and out of class, but summative assessments do not.

The common thread is clear: anything that can be done in short bursts can work well on a smartphone. So will online education rise and fall on its ability or inability to reengineer learning for bursts? Perhaps not, because mobile applications ("apps") reveal a different path. These highly designed "walled garden" digital experiences, accessible on a smartphone without regard to Internet connectivity, are the solution to the smartphone challenge. Smartphone users' sessions are currently three times longer when they're using apps than when they're browsing websites. Apps



are also visited much more frequently than websites. Total time spent on apps is currently growing at an annual rate of over 20 percent, and according to comScore, apps now account for more than 50 percent of total time spent with digital media. The heaviest app users are those in the 18–24 age group.¹⁷

Apps offer a wide array of opportunities because they are purpose-built. In this environment, we can imagine one app for Economics 101 and another for Psychology 101. Apps are also ideal for simulations and gamified learning and can tailor the user experience further by incorporating real-world inputs (e.g., location of the student) into the material.

Today's "m-learning" landscape shows no sign of this, however. Current college/university apps are about selecting courses or scheduling or finding where things are on campus. And although most online degree programs

are now delivered via learning management systems that claim to be "mobile platforms," believing that the solution to the smartphone challenge is simply allowing mobile access to the same online course is tantamount to believing that an institution's online strategy is effectively addressed by putting lectures on YouTube or iTunes.

The Great Unbundling

A college degree signals not one thing but, rather, a bundle of many things: certification of having met the institution's standards for admission; specific knowledge and skills; general education; the ability to complete a multiyear endeavor; and intangible accomplishments such as building a network and achieving personal growth.

Bundling has been central to the higher education business model for centuries. Colleges and universities

combine content and a wide range of products and services into a single package, for which they charge "tuition and fees." Tuition and fees cover everything from remedial coursework to elective courses to advanced courses in a chosen major and, extending far beyond the academic program, are used to pay for the 4 Rs. As a result, when students pay for a degree, they are also buying products and services related to real estate, dining, sports, and research. As Anant Agarwal, CEO of edX, asks: "Universities are responsible for admissions, research, facilities management, housing, health care, credentialing, food service, athletic facilities, career guidance and placement, and much more. Which of these items should be at the core of a university and add value to that experience?"¹⁸ It's a good question, because although these items don't add time-to-credential, as the academic program bundle does,

they add to the cost, which has the same effect on return on investment.

In other industries, unbundling has driven fundamental change. Over the past decade, sales of recorded music are down 50 percent and continue to fall each year. Digital technology has forced a revolution in a business model that, in the past, relied on bundling the music that consumers wanted (singles) with the music that they didn't want (the rest of the album). Now, in a music industry unbundled by technology, consumers purchase only the products they want. In the television industry, viewers now watch individual shows, thanks to DVRs and Netflix, rather than channels or networks. Many viewers are no longer even aware of which networks air their favorite shows. Once viewers are given a mechanism for paying only for the shows they watch rather than the thousands they don't, cable and satellite TV bills will collapse.

Where does this leave the higher education bundle? At present, degrees remain the currency of the labor market. But as currency, they're about as portable as the giant stone coins used on the island of Yap. What if technology could produce a finer currency that would be accepted by consumers and employers alike?

Toward a New Currency: The Competency Marketplace

In 2011 Marc Andreessen, co-founder of Netscape, asserted that software would continue to disrupt new industries, with the next targets being health care and education.¹⁹ No one familiar with education technology considered this a bold prediction, since from at least the time of the dot-com era, entrepreneurs have dreamed of disrupting colleges and universities via courseware. The following year the *New York Times* named 2012 "The Year of the MOOC." Yet neither dot-com

entrepreneurs nor MOOCs have produced courseware that is truly disruptive to higher education.

What if that is because the software that will disrupt higher education isn't courseware at all? What if the software is, instead, an online marketplace? Uber (market cap \$40 billion) owns no vehicles. Airbnb (market cap \$10 billion) owns no hotel rooms. What they do have are marketplaces with consumer-friendly interfaces. By positioning their interfaces between millions of consumers and sophisticated supply systems, Uber and Airbnb have significantly changed consumer behavior and disrupted these supply systems.

Is there a similar marketplace in the higher education arena? There is, and it has 40 million college students and recent graduates on its platform. It is called LinkedIn.

Indeed, LinkedIn CEO Jeff Weiner has been very clear about his ambition, stating in November 2014:

We want to have a profile for every member of the global work force, all 3 billion-plus people. We want to have a profile for every company in the world—that's north of 70 million companies—and digital representation of every job in the world. We also want digital representation of every skill required to obtain those jobs, a digital presence for every university in the world, and we want to make it easy for every individual company and university to share their professionally relevant knowledge. In doing all of this, we hope to allow all forms of capital to flow to where it can best be leveraged to lift and transform the global economy.²⁰

What Weiner calls an "economic graph" we call a "competency marketplace."

Competency marketplaces will profile the competencies (or capabilities) of students and job seekers, allow them to identify the requirements of employers, evaluate the gap, and follow the educational path that gets them to their destination quickly and cost-effectively. Although this may sound like science fiction, the gap between the demands of labor markets and the outputs of our educational system is both a complex sociopolitical challenge and a data problem that software, like LinkedIn, is in the process of solving.

LinkedIn is already providing tools like Field of Study Explorer and University Finder to recommend programs and universities to its massive young audience. It also allows students to automatically add competencies to their profiles from select online training providers and universities. In February 2014, LinkedIn spent \$120 million—its largest acquisition to date²¹—on Bright.com, a company that had developed sophisticated algorithms for parsing competencies from job descriptions and resumes and then matching them. If LinkedIn is able to achieve Weiner's vision by adding an Uber-like interface atop Bright.com's algorithms, it could find itself managing the competency profiles of hundreds of millions of professionals and brokering their human capital transactions with employers and educational providers. It could be the "software" that Andreessen foretold and that colleges and universities have long feared.

The University in the Competency Marketplace

As competency marketplaces and their associated algorithms become increasingly sophisticated, employers and students will begin to value the signals from these tools more than the signals from nonelite universities' bundled degrees. (The signals from elite universities' bundled degrees will remain strong, largely due to the high caliber of the inputs.) As employees who are matched on the basis of competencies (and then hired through standard

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interviewing techniques for behavioral and cultural fit) excel in the workplace, this trend will only be reinforced. Employers will adjust job descriptions to reflect the incoming competencies of high-performing candidates, and competency matches will get better and better.

At some point, a student will walk into the college admissions office and say: “I’ve read your programs of study, and your Environmental Engineering program looks interesting. But how will it help me take my competency profile from where it is today to where LinkedIn says it needs to be in order to get an entry-level job as an engineer?” Colleges and universities that offer competency-based programs will at least speak the same language as this student. That’s necessary, but not sufficient. A sufficient response will require unbundling the degree.

One way to think about a degree is as a piece of enterprise software: both have a big price tag for a one-time purchase, followed by annual maintenance fees (aka alumni contributions). Enterprise software was often called “bloatware” by its detractors because it included so many functions that customers rarely used. Leading software companies are now abandoning the enterprise model and moving to software-as-a-Service (SaaS) models that allow customers to rent software per user per month and pay only for the functions that they need. Likewise, colleges and universities may soon transition from the bloated degree model to an “Education-as-a-Service” (EaaS) model. Successful providers will sell students what they need when they need it: a “just-in-time” educational model that is much closer to today’s coding schools than current degree programs. Just as the goal of SaaS companies is to win and profit from customers for life, successful colleges and universities will serve their students for life, providing a range

of programs and credentials as their students’ needs evolve over time.

Who Owns the Competency?

The core of the competency marketplace is profiles: profiles of people, of jobs, and of learning experiences. The main function of the marketplace is to match one to the others on the basis of competencies. Competency marketplaces will be fine with handing over ownership of profiles to users because the marketplaces will own the metadata produced by their algorithms that parse and extract competency statements from profiles of people and then match those to profiles of jobs and learning experiences. That’s all well and good. But competency marketplaces will work best for people, employers, and educational providers when the metadata is made visible—that is, when competencies (and levels) are affixed to profiles. For example, if the competency marketplace determines that someone is likely a Level 6 on Locating Information, this metadata needs to be visible to employers and educational providers in order to be useful.

All of this raises a massive privacy issue: when a competency marketplace assigns a competency based on an algorithmic analysis of a user’s profile (and perhaps of similar users’ profiles), who owns the competency? This will matter a great deal, since competency marketplaces will pursue any and all of the following revenue streams with the metadata produced from users’ profiles:

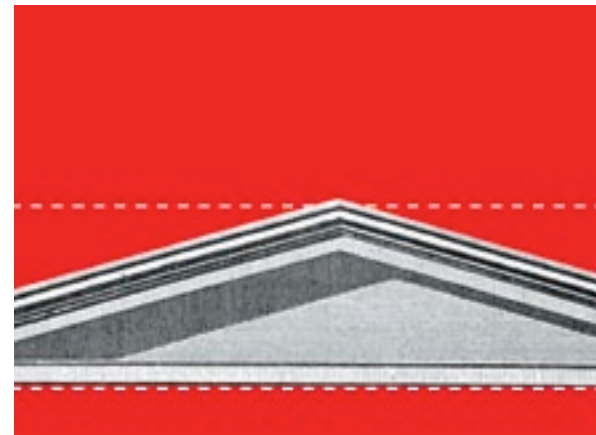
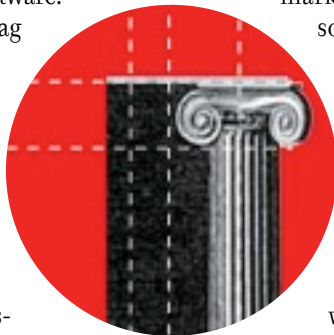
- Suggest jobs/employers where the user matches today
- Identify the user to prospective employers where the user appears to be a good match today
- Suggest future jobs/employers based on the user’s trajectory, velocity, and zone of proximal development
- Pre-identify the user to prospective

employers where the user may be a good match tomorrow

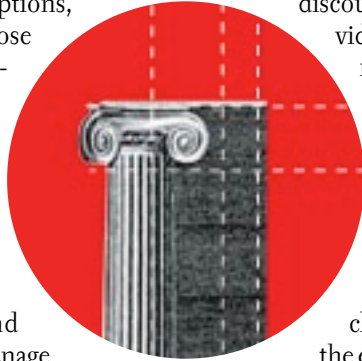
- Facilitate assessments, curriculum, project work, and virtual internships with prospective employers
- Suggest educational experiences based on target jobs/employers and competency gaps
- Pre-identify the user to prospective education providers based on target jobs/employers and competency gaps
- Facilitate (free) educational interactions with prospective education providers

Each of these is a potential revenue stream for competency marketplaces, either from the employer or from the education provider. There’s a great deal of money to be made here, but it hinges on the very real question of ownership of the competency. If ownership is held by the competency marketplace, we may find ourselves in a world where there’s more money to be made from owning the competency profile than from delivering postsecondary education. This means a significant diminution not only in the role of faculty but also in the role of higher education institutions.

To avoid marginalization, colleges and universities need to insist that individuals own their competencies. Ensuring that ownership lies with the individual could make the competency profile portable and could facilitate movement across marketplaces, as well as to higher



education institutions. In an era of unbundling, when colleges and universities need to move from selling degrees to selling EaaS subscriptions, the winners will be those that can turn their students into “students for life”—providing the right educational programs and experiences at the right time. This becomes possible when individuals own their competencies and allow institutions to manage their profiles, suggesting educational programs and even employment.



Conclusion

Colleges and universities have their work cut out for them over the next decade. They must begin to capture and use data to allocate resources and must start

to organize themselves on the basis of student outcomes (rather than the 4 Rs).

They must decide if they are going to be discounters or premium providers, and if the latter, they must become “full-stack” institutions. They must utilize technology to solve the crisis of affordability and to improve efficacy. They must figure out how to meet the smartphone challenge and ensure that the evolution of online learning doesn’t stall.

In the coming years, many institutions will succumb to the current inertia that is too prevalent in higher education. Some institutions will address some of these issues and will survive. Others will successfully address most of these issues and will then need to prepare for the

next seismic change in higher education: The Great Unbundling. ■

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