

Hire Education

Mastery, Modularization, and the Workforce Revolution

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INTRODUCTION: GOT SKILLS?

The economic urgency around higher education is undeniable: the price of tuition has soared; student loan debt now exceeds \$1 trillion and is greater than credit card debt; the dollars available from government sources for colleges are expected to shrink in the years to come; and the costs for traditional institutions to stay competitive continue to rise.

At the same time, more education does not necessarily lead to better outcomes.¹ Employers are demanding more academic credentials for every kind of job yet are at the same time increasingly vocal about their dissatisfaction with the variance in quality of degree holders.² The signaling effect of a college degree appears to be an imprecise encapsulation of one's skills for the knowledge economy of the times. McKinsey analysts estimate that the number of skillsets needed in the workforce has increased rapidly from 178 in September 2009 to 924 in June 2012.³

Students themselves are demanding more direct connections with employers: 87.9 percent of college freshmen cited getting a better job as a vital reason for pursuing a college degree in the 2012 University of California Los Angeles' Higher Education Research Institute's "American Freshman Survey"—approximately 17 percentage points higher than in the same survey question in 2006;⁴ a survey of the U.S. public by Gallup and the Lumina Foundation confirmed similarly high numbers.⁵ "Learning and work are becoming inseparable," argued the authors of a report from the Institute for Public Policy Research, "indeed one could argue that this is precisely what it means to have a knowledge economy or a learning society. It follows that if work is becoming learning, then learning needs to become work—and universities need to become alive to the possibilities."⁶

Even the demographics of students seeking postsecondary education are shifting. The National Center for Education Statistics projects that by 2020, 42 percent of all college students will be 25 years of age or older.⁷ More working adults are becoming responsible for actively honing and developing new skills for the new technologies and jobs emerging on a day-to-day basis.

Despite these trends, few universities or colleges see the need to adapt to the surge in demand of skillsets in the workforce. Distancing themselves from the notion of vocational training, institutions remain wary of aligning their programs and majors

to the needs of today's rapidly evolving labor market. At the same time, the business models of most traditional schools make them structurally incapable of responding to changes in the markets that they serve. Therefore, whether institutions like it or not, students are inevitably beginning to question the return on their higher education investments because the costs of a college degree continue to rise and the gulf continues to widen between degree holders and the jobs available today.

Who will attend to the skills gap and create stronger linkages to the workforce? This book illuminates the great disruptive potential of online competency-based education. Workforce training, competency-based learning, and online learning are clearly not new phenomena, but online competency-based education is revolutionary because it marks the critical convergence of multiple vectors: the right learning model, the right technologies, the right customers, and the right business model. In contrast to other recent trends in higher education, particularly the tremendous fanfare around massive open online courses (MOOCs), online competency-based education stands out as the innovation most likely to disrupt higher education. As traditional institutions struggle to innovate from within and other education technology vendors attempt to plug and play into the existing system, online competency-based providers release learning from the constraints of the academy. By breaking down learning into competencies—not by courses or even subject matter—these providers can cost-effectively combine modules of learning into pathways that are agile and adaptable to the changing labor market.

The fusion of modularization with mastery-based learning is the key to understanding how these providers can build a multitude of stackable credentials or programs for a wide variety of industries, scale them, and simultaneously drive down the cost of educating students for the opportunities at hand. These programs target a growing set of students who are looking for a different value proposition from higher education—one that centers on targeted and specific learning outcomes, tailored support, as well as identifiable skillsets that are portable and meaningful to employers. Moreover, they underscore the valuable role that employers can play in postsecondary education by creating a whole new value network that connects students directly with employers.

An examination of online competency-based education unveils the tectonic shifts to come in higher education. Over time, the industry-validated experiences that emerge from the strong partnerships between online competency-based providers and employers will ultimately have the power to override the importance of college rankings and accreditation.

* * *

- Chapter 1 uses the theory of disruptive innovation to illustrate how the inertia of the academy inevitably makes way for upstart disruptors—online, competency-based educational programs—to seize a market of untapped connections between learning and work.
- Chapter 2 illuminates how students are looking for a new value proposition from higher education.
- Chapter 3 outlines the core—both online and offline—of competency-based education in order to show in the following chapter why online competency-based education holds particular appeal for the growing segment of the college-going population described in Chapter 2.
- Chapter 4 describes how online competency-based education providers—unfettered by the constraints of the academy—are uniquely positioned to align learning to workforce needs.
- Chapter 5 reveals the transformative power of a new value network that emerges from industry-validated learning experiences.
- Chapter 6 predicts the long-term impact that online competency-based education will have on the postsecondary system as a whole.

1

DISRUPTIVE INNOVATION AND ACADEMIC INERTIA

When it comes to higher education, there is a lot of buzz about online education's potential disruption of traditional postsecondary education. Unfortunately, the word "disruption" is bandied about so frequently that most audiences misunderstand the term or imprecisely frame the threat.⁸

A disruptive innovation explains why it is so difficult for organizations to sustain success.⁹ In business, companies tend to innovate faster than their customers' needs evolve. Most end up producing products or services that are too sophisticated, too expensive, or too complicated for many customers in their market. They pursue these sustaining innovations because this is what has historically helped them succeed: by charging the highest prices to their most demanding and sophisticated customers, companies achieve greater profitability. Inevitably, though, they overshoot the performance needs of their customers and, at the same time, unwittingly open the door to disruptive innovations at the bottom of the market. A disruptive innovation gains traction by initially offering simpler, more affordable, and more convenient products and services to nonconsumers, people for whom the alternative is nothing at all.

Understanding the nonconsumer in higher education

Many people who are busy predicting the potential disruption of higher education miss that the process of disruption began as early as 1989 when the University of Phoenix and DeVry University launched online universities. At that point, online technology had become reliable enough to help these universities scale the teaching and learning process and cater to nonconsumers of higher education—students for whom their alternative to an online higher education was nothing at all. Online technology was the technological enabler needed to enable disruption in the higher education industry.¹⁰

Some observers, however, tend to dismiss the idea that these learning pathways were disruptive by disparaging the quality of these educational experiences.¹¹ A disruptive innovation's first, simple application, however, is often of a lower quality according to traditional metrics of performance. Over time, it improves gradually to become good enough to take on a larger share of the market by solving more complicated problems.

In this particular case, regardless of the questionable quality of this online-learning experience, students flocked to these fully online universities. This first wave of online education presented working adults with a new value proposition around flexibility and convenience by allowing many to avoid the opportunity costs of quitting their jobs. Those who enrolled preferred having a just-good-enough educational experience to nothing at all. Students were willing to pay a premium price for a functional, flexible, and convenient source of learning. Unfortunately, however, these fully online universities were never able to fill satisfactorily the gap between students and the workforce because they began chasing Title IV money in a federal financial aid system ripe for gaming. Their march up-market toward a full transformation of the higher education industry never came to pass, as the student loan crisis—not to mention some of the predatory recruiting practices of leading for-profits—came to the public's attention. Nevertheless, even before these revelations came to light, a second wave of online programs began to emerge, that competed on price, which, according to the Parthenon Group, is increasingly displacing convenience as the most important factor for many students in attending college.¹² Unlike the University of Phoenix, which charges \$570 per credit hour, American Military University (AMU), a low-cost, for-profit institution, which operates in the American Public University System (APUS) along with American Public University, charges \$250 per credit hour. A more recent wave of disruptors that includes Southern New Hampshire University's College for America (CfA) and UniversityNow's Patten University (UNow) is even lower-priced and incorporates online competency-based learning. We explain the cost advantage of these particular programs later in the book.

Still, many observers maintain that that these learning pathways are not disruptive by pointing out how most traditional institutions remain unscathed by these supposed disruptors.¹³ The emergence of disruptive innovations, however, does not entail the immediate downfall of established organizations. Disruptive

innovations do not compete directly at the outset with the leaders of the industry. In fact, the theory predicts that head-on competition with incumbents most often results in failure.

Traditional institutions have continued to thrive financially because the initial wave of disruptive entrants targeted a completely separate market. Often referred to as nontraditional students, this market is comprised of people who are often older than the typical 18 to 22-year-old student population, are not enrolled full-time, do not live on campus, and have work, family, or other responsibilities that can interfere with the successful completion of their learning objectives. Oddly, the nontraditional student has become the new normal, as somewhere around 71 percent of the college-going students in America now fall under this misnomer.¹⁴

Most institutions are aware that the demographic of college-going students is shifting and that students' priorities are likewise evolving. Nevertheless, just as in every tale of disruption, the established organization is hamstrung, as it sees the disruptive entrant making its way into the market but cannot do anything but develop sustaining innovations. The business model of the incumbent's organization inevitably steers its leaders to invest in improvements that affect only its existing or most desirable or demanding customers.

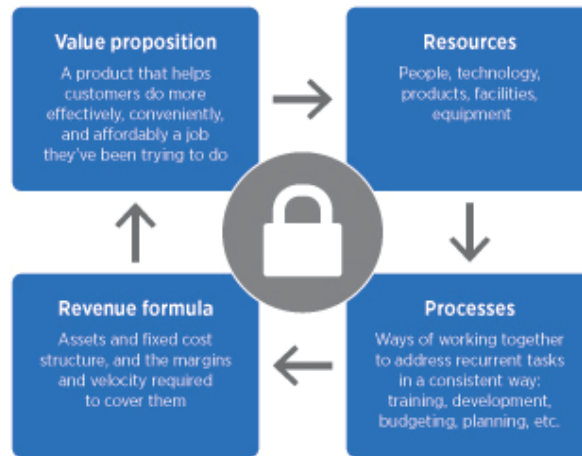
Particularly over the last few decades, traditional institutions have invested substantial resources into competing with their fellow institutions. In a race to move up in the rankings—similar to what we see in industry after industry that has experienced disruption—most universities have focused their efforts on sustaining innovations: increasing inputs, such as enhanced technology in teaching, improved classrooms, more faculty research, and better residence halls and dining facilities. There are various labels for this up-market pull in higher education. Economist Gordon Winston describes it as an “arms race.”¹⁵ Kaplan CEO Andrew Rosen calls it “Harvard envy”¹⁶: the desire of universities to emulate Harvard's prestige and exclusivity by “spending far too much time and energy trying to be something they're not.”¹⁷ As a report from the National Bureau of Economic Research explained: “[F]or many institutions, demand-side market pressure may not compel investment in academic quality, but rather in consumption amenities.”¹⁸

Such amenities add significant cost,¹⁹ and although they serve well the traditional, campus-based students, these sustaining innovations do not help nonconsumers of higher education. Traditional institutions inevitably over-serve adult learners looking to advance their careers with amenities that they do not need. These students seek affordable and flexible learning pathways that allow for faster times to degree completion—not to mention the ability to pick and choose their education from different institutions and outlets. They are less willing to pay for what they will never use. Furthermore, looking ahead, these amenities may overshoot what traditional, campus-based students are willing or able to pay for them, which would create more headroom for disruptive innovations to grow.

Academic inertia

Unfortunately, established institutions cannot help but develop sustaining innovations that carry them up-market because, like most businesses, they are comprised of four basic and deeply interdependent components.

Figure 1. The elements of a business model



As depicted in Figure 1, the starting point in the creation of any successful organization's business model is its value proposition. For a liberal arts college, for instance, that value proposition might be to offer excellent teaching in small, intimate settings. Institutional leaders then put in place a set of resources—faculty members in different departments, dollars spent per student, buildings, labs, and other capital expenditures—required to deliver that value proposition. In repeatedly working toward that goal, processes, such as course enrollment, student recruitment, financial aid packaging, tenure promotion, accreditation management, and fundraising, coalesce that define how resources are combined to deliver the value proposition. This very complex set of elements goes through multiple iterations and cycles of change before a stable revenue formula emerges, which depends on state and federal subsidies, tuition, and endowment funds, and supports the resources and processes.

Such stability is difficult to achieve. In fact, once the four interdependent components come together to deliver education in a sustainable manner, the business model then begins to work in reverse. Instead of the value proposition driving the resources, processes, and revenue formula, the business model begins to dictate the sorts of value propositions the organization can or cannot deliver.²⁰ Because this balance is so challenging to get right, the business model of traditional institutions cannot evolve easily, particularly in the face of rapid innovation. As a result, disruptive innovations generally appear unattractive to the organization

because they are fundamentally at odds with the business model—value proposition, resources, processes, and revenue formula—of the college or university.²¹

Another way to capture the incompatibility of a disruptive innovation within the business model of an established university is to consider the forces that encumber the legislative process. Even if a member of Congress were to identify and envision an innovative solution to a pressing societal problem, the introduction of a bill can evoke opposition from different constituencies, such as labor unions, the Chamber of Commerce, or a powerful senator threatening to block the legislation—all of whom must be appeased in some way. As a result, in order to garner enough votes to be enshrined as law, the bill is modified to address their concerns and fit the interests of those with powerful votes. The result is a final bill that only faintly resembles the original innovative solution.

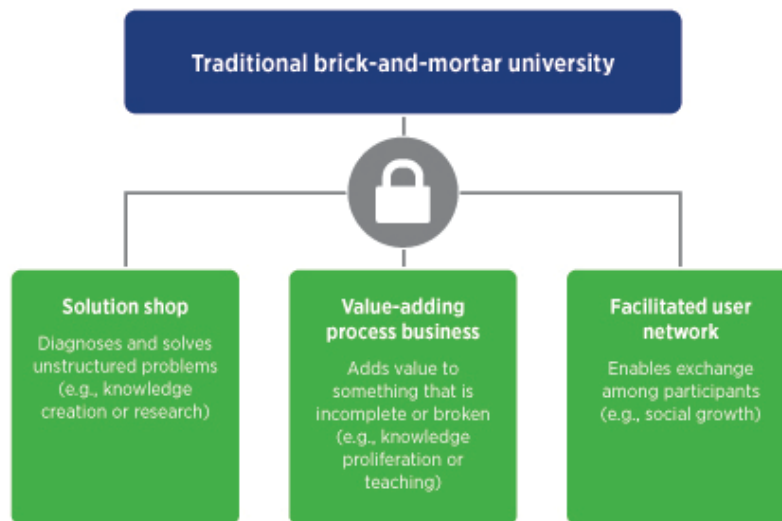
These same forces are at work in every company and every organization. The powerful forces that emerge from the balancing act of Figure 1 inevitably take every new innovative proposal and shape it into a sustaining innovation—one that conforms to the existing organization's own business model. This is a core reason why traditional institutions are at a disadvantage when disruptive innovations emerge; they are asymmetrically motivated to pursue sustaining innovations only—not disruptive ones.

A clear example of asymmetric motivation can be found in the computer industry. When the first personal computers were being commoditized, Digital Equipment Corporation (DEC) was in the prime of its life and building better and more expensive minicomputers for their best customers. For the first 10 years, the personal computer from Apple simply could not perform well enough for DEC's customers; in fact, it was marketed as toy for children. The two companies sold to completely different markets, and it simply did not make sense for DEC to pursue the personal computer market. DEC's gross margins were in excess of \$100,000 per unit, whereas the gross margins that could be earned from selling a personal computer were less than \$1,000 per unit. Over time, however, as personal computers evolved, they became good enough to do much of what mainframes and minicomputers could do and ultimately disrupted DEC. The only way DEC could have avoided collapse is if it had set up a new autonomous business unit with new cost structures, prioritization criteria, and values.

Organizations cannot disrupt themselves. They cannot transform the business models of their existing business units into disruptive growth businesses because they will naturally prioritize innovations that promise improved profit margins relative to their current cost structure. Companies such as Hewlett-Packard, Johnson & Johnson, and General Electric have managed to survive the last few decades by creating new, smaller, autonomous disruptive business units and shutting down or selling off mature ones that had reached the feasible end of their sustaining-technology trajectories.

The options for traditional institutions of higher education, however, are arguably more constrained, as most schools manage even more complicated business models than a typical company. Colleges and universities generally house what should be three different business models within one overarching business model. Figure 2 illustrates these three different models, which we call solution shops, value-adding process (VAP) businesses, and facilitated networks.²²

Figure 2. The three generic business models



Briefly, a solution shop is structured to diagnose and solve unstructured problems while charging a fee for service. Certain consulting firms, advertising agencies, research and development organizations, and law practices are examples of solution shops. Experts draw on their intuition, training, and analytical and problem-solving skills to diagnose the cause of complicated problems and then recommend solutions. Research in a university setting can be described as a solution shop model.

VAP businesses transform inputs of resources—people, materials, energy, equipment, information, and capital—into outputs of higher value while charging a fee for the outcome. Retailing, restauranteering, automobile manufacturing, petroleum refining, and teaching are examples of VAP businesses.

Finally, facilitated networks are systems in which customers often pay a membership or subscription fee to buy and sell and to deliver and receive things from other participants. Much of consumer banking is a network business in which customers make deposits and withdrawals from a collective pool. Casinos, Second Life, and multiplayer Internet games could also be described as facilitated networks. Universities run a multitude of facilitated networks within which students work with each other, career staff, or even alumni to succeed and have fun.

Most traditional institutions offer all three of these very distinct conflicting value propositions around knowledge creation, knowledge proliferation, and preparation for life and careers—all bundled together. The precise costs of producing these different parts of an education are in many ways unknowable because they are interdependent and inseparable in the current system.

The result of bundling together three incompatible business models is a surge in overhead and direct labor costs. Universities have dramatically increased their administrative capacities in order to cover these different and often conflicting value propositions. In a study of all colleges and universities in Massachusetts, reporter Jon Marcus explained that in no other industry would university enrollment increase by 26 percent and the ranks of full-time administrators rise by 75 percent—well over the growth of those involved in teaching and research.²³ The Goldwater Institute called the phenomenon “administrative bloat” in its 2010 report, citing:

Between 1993 and 2007, the number of full-time administrators per 100 students at America’s leading universities grew by 39 percent, while the number of employees engaged in teaching, research or service only grew by 18 percent. Inflation-adjusted spending on administration per student increased by 61 percent during the same period, while instructional spending per student rose 39 percent.²⁴

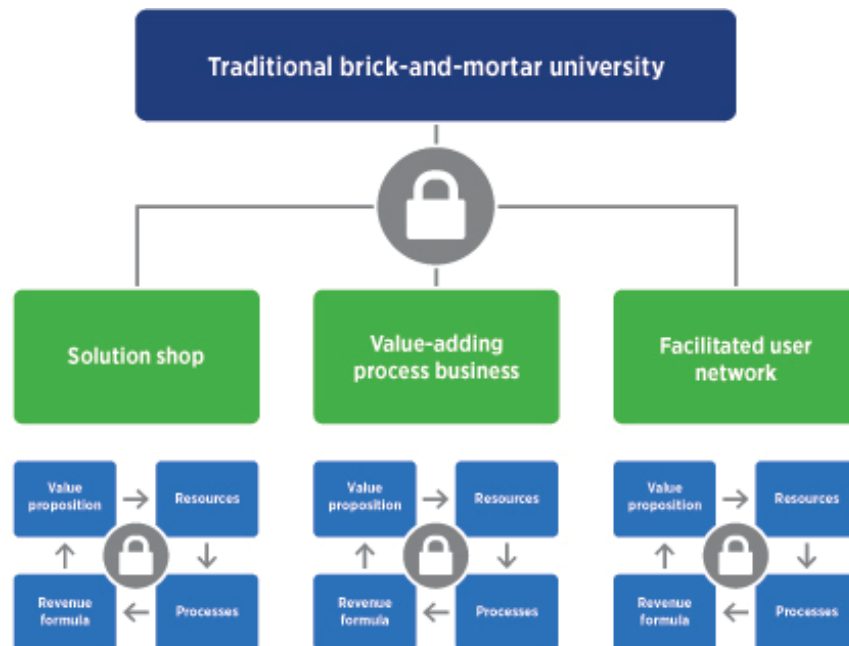
Part of the surge in administrative costs is also because of an increased reliance on adjunct faculty members in colleges. Today, contingent faculty make up 76 percent of the academic labor force,²⁵ and only 50 percent of faculty are employed full-time.²⁶ By hiring more contingent faculty members, institutions must update their payrolls every academic term. Maria C. Maisto, president of the New Faculty Majority, an advocacy group for instructors off the tenure track, describes the time and resources dedicated to this repetitive administrative task as “one of the hidden costs of contingency.”²⁷

Increasing administration is of course a natural response when trying to coordinate all of a university’s different value propositions, but as economists Robert E. Martin, professor emeritus at Centre College, and R. Carter Hill, professor at Louisiana State University at Baton Rouge, concluded, the imbalance between faculty and administrators is responsible for climbing college costs.²⁸ Inside Higher Ed’s 2013 survey similarly affirmed that “82 percent [of college and university business officers] say centralizing/consolidating administrative functions is important to reducing operating expenses.” Such consolidation, however, is easier said than done.²⁹

Unfortunately, these fiscal realities leave schools open to disruptive entrants with far more focused business models. Online providers often concentrate exclusively on teaching without regard to faculty scholarship or the social growth of the student population, which drives their costs down.³⁰ Delivering on a single value proposition is simpler and more straightforward than what most traditional

institutions must do. Figure 3 illustrates the inordinate complications involved in coordinating the right mixture of the various components of three distinct business models.

Figure 3. The many moving parts of delivering on three different value propositions



The challenge is undeniable when it comes to delivering on three different value propositions around research, teaching, and social growth. It is no wonder that institutions appear to be resistant to change; most institutions are structurally incapable of responding to changes in the markets that they serve because this tenuous and prized stability must remain intact. As evidence, even when traditional institutions offer online programs, they often price them similar to their existing programs to support their existing business model. A disruptive innovation appears financially unattractive for the established institution to pursue relative to its existing revenue model as well as the other investments that are competing for the organization's resources. A better understanding of business model inertia reveals how traditional institutions remain unchanged in the face of innovation, not because they are unaware of disruptive entrants, but because they are fundamentally constrained in responding to systemic shifts in higher education. Because the conditions are ripe for disruption now, universities are in a perilous position, as they are unable to respond naturally from within and are playing a game that opens up more disruptive opportunities from below.

2

JOBS TO BE DONE: THE SHIFTING VALUE PROPOSITION OF COLLEGE

The context around higher education has altered dramatically: a college diploma no longer leads automatically to desirable jobs nor to middle-class status; tuition costs continue to soar and more of the financial burden of pursuing higher education is transferred onto students and their families. Meanwhile, students' priorities are changing. There are a growing number of students who are finding themselves overserved by the augmented, bundled services that traditional institutions provide. They are looking for brief, targeted, and affordable lifelong-learning programs with flexible pacing. Some might already have degrees or are struggling to transition within or into the workforce; they may be observing firsthand the immediacy of economic uncertainty. As a result, these students are becoming savvier shoppers of higher education and are looking for a different job to be done in our parlance.³¹

The premise of jobs to be done is simple: customers don't just buy products or services; they hire them to do a job. As the great marketing professor Theodore Levitt taught, "The customer doesn't want a quarter-inch drill. He wants a quarter-inch hole!"³² Hence, when one customer "hires" a product to do one job, she may be delighted with its quality because the product did that particular job well.

Another customer with a very different job to be done, however, might hire the same product and judge it to be low in quality—not because the product is different, but because the job is different. A single product or service can do multiple jobs depending on who is hiring it.

In this particular case, the major skills gap in the United States has created a new job to be done for students that centers on learning to do in the workforce.³³ As employers have become more vocal about their dissatisfaction with the unpreparedness of job candidates and have retreated from offering as much training upon entry as they used to, more students are becoming cognizant of the need to hire a cost-effective and streamlined program that moves them ahead in their working lives.

College or graduate school is not necessarily the answer, as many traditional institutions do not even offer majors or programs in the areas in which students are looking to skill-up. Although there are various community colleges, regional schools, and offline competency-based providers that already work in concert with companies to mitigate workforce shortages,³⁴ it takes time and requires substantial resources to replicate or tailor programs for different companies and industries.

There is a clear need for providers that can build high-quality programs in a cost-effective manner. Disruptive entrants have an opportunity to gain traction in this market of untapped connections between learning and work. Although traditional schools might characterize these offerings as mere vocational programs, they are measuring quality or “goodness” with standards that are irrelevant.³⁵ A new wave of disruptive providers can compete on completely different metrics by focusing on a more dynamic job to be done for nonconsumers of higher education: more direct pathways to employment. The notion of vocational training is evolving beyond career education or factory jobs per se to represent a strengthening of what Anthony Carnevale, director of Georgetown University’s Center on Education and the Workforce, calls the “cross-fertilization between liberal education and more applied curricula.”³⁶

3

THE CORE OF COMPETENCY-BASED EDUCATION

The perfect storm is here: with costs spiraling out of control, the gap widening between the academy and the workforce, and existing institutions incapable of reforming their inefficient business models, online competency-based providers are now stepping into the void. In order to understand the great promise of these online competency-based providers, we must first lay out the core of competency-based education. Whether offline or online, competency-based education is about gaining mastery of a subject regardless of the time it takes to get there. Learning pathways can differ, as all students come to a subject with varying levels of understanding and different sets of knowledge and experiences, which, in part, lead to their learning at different rates. Through direct assessments, a student can be tested on her mastery of any competency.

In 2011, Susan Patrick, president and CEO of the International Association for K–12 Online Learning (iNACOL), and Chris Sturgis, an education consultant with many years of experience in competency-based education, developed a five-part working definition of high-quality competency education:

1. Students advance upon demonstrated mastery.
2. Competencies include explicit, measurable, transferable learning objectives that empower students.
3. Assessment is meaningful and a positive learning experience for students.

4. Students receive rapid, differentiated support based on their individual learning needs.
5. Learning outcomes emphasize competencies that include application and creation of knowledge along with the development of important skills and dispositions.³⁷

This particular definition was intended for a K–12 audience, but the core of competency-based learning for the postsecondary world remains the same.

Competency-based programs have no time-based unit. Learning is fixed, and time is variable; pacing is flexible. Students cannot move on until they have demonstrated proficiency and mastery of each competency but are encouraged to try as many times as necessary to demonstrate their proficiency. Although skeptics may question the “rigor” behind an experience that allows students to keep trying until they have mastered a competency, this model is actually far more rigorous than the traditional model, as students are not able to flunk or get away with a merely average understanding of the material; they must demonstrate mastery—and therefore dedicated work toward gaining mastery—in any competency.

Toyota's famed production system offers an example of the power of competency-based education on learning and assessment. In his book *Chasing the Rabbit*, Steven Spear recounts working at the passenger-side front seat installation point on an assembly line at Toyota and one of the Detroit Big Three plants.³⁸ At the Detroit Big Three factory, the person training Spear said, “The cars come down this line every 58 seconds, so that’s how long you have to install this seat. Now I’m going to show you how to do it. First, you do this. Then do that, then click this in here just like this, then tighten this, then do that,” and so on, until the seat was completely installed. Spear was quite certain he could do each of those things in the allotted time, given that he had earned a master’s degree in mechanical engineering from MIT. When the next car came down the line, he confidently started the process, but by the end of the 58 seconds he had not completed the installation. His trainer had to stop the assembly line to fix the problem. He then showed Spear how to do it again, but when the next car arrived, Spear failed to install the car seat. In the span of an hour, he managed to install only four seats correctly. One reason why it historically was so important to test every product when it came off the end of a production line like the Detroit Big Three’s was that there were typically hundreds of steps involved in making a product, and the company could not be sure that each step had been done correctly. In business, the end-of-the-line activity is called “inspection.” In education, it is called “assessment” or “testing.”

When Spear went to work at the same station in Toyota’s plant, he had a completely different experience. First, he went to a training station where he was told, “These are the seven steps required to install this seat successfully. You don’t have the privilege of learning step 2 until you’ve demonstrated mastery of step 1. If you master step 1 in a minute, you can begin learning step 2 a minute from now. If step 1 takes you an hour, then you can learn step 2 in an hour. And if it takes you a

day, then you can learn step 2 tomorrow. It makes no sense for us to teach you subsequent steps if you can't do the prior ones correctly." Testing and assessment were integral parts of the process of instruction. As a result, when Spear took his spot on Toyota's production line, he was able to do his part correctly the first time and every time. Toyota had built into its process a mechanism to verify immediately that each step had been done correctly so that no time or money would be wasted fixing a defective product at the end of the line. The training time was variable, but assessment was integrated into content delivery, and the result was fixed; every person who went through the training could predictably do what he had been taught to do. As a result, the company did not have to test its products when they came to the end of the production process.

Frequent, low-stakes assessments, exercises, and projects are integral to competency-based programs, but audiences often tend to assume mistakenly that because of the rigorous data and measurement that results, competencies are inherently STEM-related or align well only with subjects that can be assessed quantitatively. The emergence of competency-based programs, however, does not in any way necessitate the death of the liberal arts. Proving the point, Northern Arizona University (NAU) has created a competency-based degree in the liberal arts through its Personalized Learning program.

Competencies are simply units that, unlike credit hours, measure specific student-learning outcomes. As Robert Mendenhall, president of Western Governors University (WGU), said,

While competency-based education is better for all students because it allows them to study and learn at their own pace, it is particularly ideal for the 37 million American adults with some college but no degree. It makes it possible for them to come back, accelerate the learning process, and complete a degree, which can mean a better job, higher earning potential, and a better life.³⁹

4

ONLINE COMPETENCY-BASED EDUCATION: MASTERY AND MODULARIZATION

Competency-based education exists offline in many cases, but without a technological enabler, offline programs cannot take full advantage of what competencies have to offer. The vanguard of online competency-based learning providers is developing technology to ensure that time is truly the variable factor and learning is fixed: assessments are built into the system to ensure students' proficiency; students can take assessments⁴⁰ as many times as necessary until they have mastered the competency; and instructors can rely on an analytics dashboard and cater to students' needs like a personalized tutor when necessary.

As impressive as these developments are, however, technology is not the sole, causal mechanism when it comes to understanding competency-based education's potential disruption of traditional institutions of higher education. Disruption does not necessarily entail a technological breakthrough, but instead combines nascent technologies with business model innovation.

In this particular case, the powerful integration of robust technologies enhances the ability of competency-based providers to modularize the learning process. Competencies have a unique architecture as they break down learning into modules that are not inextricably tied to courses or topics. Time-based courses are the main currency in traditional institutions, and in general, it is nearly impossible to excise a week of learning from one class and insert it into another course in an unrelated field. In an online competency-based environment, however, all learning materials are tagged and mapped differently. Competencies are comprised of series

of learning objectives, and, in many cases, students can draw on resources from various subject areas to achieve their learning objectives in order to master a competency. The same online competency-based provider therefore can easily combine and stack learning modules together for these very different students because learning is not broken down by subject matter. A student in an MBA program and another studying nursing might have similar learning objectives but draw on different content and materials to achieve those learning objectives.

This flexible architecture, which technology enhances, enables online competency-based providers to create and scale a multitude of stackable credentials or programs for a wide variety of industries, all while simultaneously driving down the cost of educating students for the opportunities at hand. The savings to the students are dramatic: as an example, a full year at CfA is only \$2,500 per year, which means that even if it took four years to complete the program (and it could presumably take much less time because pacing is flexible in a competency-based program), a bachelor's degree would cost \$10,000 total—less than what it would cost at many community colleges.

The true disruptive potential of these online competency-based programs lies in the critical convergence of multiple vectors: the right learning model, the right technologies, the right customers, and the right business model. For a growing set of students who are looking for a different value proposition out of college—one that centers on affordable and targeted programs, tailored support, as well as identifiable skillsets that are portable and meaningful to employers—online competency-based education hits the mark.

Embedded inefficiencies of the academy and the release from those constraints

Meanwhile, incumbent institutions are not unaware of this oncoming disruption, but they are prohibited from reacting to these systemic shifts. Overwrought with constraints, most colleges and universities are structurally incapable of facilitating innovations that deviate from the way they currently deliver education. To complicate matters, shared governance between the various stakeholders on campus—faculty members, administrators, leaders, and boards of trustees—exacerbates the orchestration of so many moving parts. Time and precedence also tend to normalize processes that might have been jury-rigged in the past as workable solutions. Each college or university inevitably builds a “culture” around these processes that become reified with the passage of time and makes it even more difficult to effect change from within.⁴¹ In turn, those within academia accept or become habituated to these constraints as the culture, or the way things have always been done at the institution. The result is a normalization of what we call embedded inefficiencies.

The following sections juxtapose embedded inefficiencies of traditional institutions with the most exciting developments from various competency-based providers to show how effectively online competency-based education releases

learning from these constraints. Not all of these innovations can be found in a single organization's platform or business model today. Instead, we have gathered the best and most innovative examples from multiple providers in order to illustrate how competency-based education—in its ideal and most disruptive state—would be able to diverge from and improve upon the existing order in higher education.

A contrast of embedded inefficiencies and the release from constraints exposes just how impressively the vanguard of outcomes-oriented learning pathways diverges from the sustaining innovations in traditional institutions of higher education. It also makes obvious how existing institutions by necessity are unable to adopt these exciting developments and why postsecondary education is poised for dramatic disruption.

Embedded inefficiency: Time is fixed

Institutions of higher learning do everything possible to measure fixed seat time by relying heavily on the Carnegie unit, or the credit hour. Unfortunately, however, "the credit hour was never intended to be a measure of, or proxy for student learning."⁴² As Amy Laitinen, deputy director of the New America Foundation, wrote, "Andrew Carnegie set out to fix a problem that had nothing to do with high school courses: the lack of pensions for college professors."⁴³ What began as a way of accessing Carnegie's pension program quickly became the building block of every college course and degree program as well as a signaling mechanism of educational quality. Colleges and society now attribute a bachelor's degree to the accumulation of 120 hours of course work. This numerical output has strangely become a proxy for quality even though there are no standard assessments tied to measuring this time-based learning—in other words, there is no assurance that a student has accomplished anything meaningful in this time.

Indeed, there is actually no substantive reason why college should take four years.⁴⁴ As early as 1890, Charles Eliot as president of Harvard University called into question the need for college to take more than three years. Eliot had tried to reduce the number of credits needed for a bachelor's degree; however, because of financial exigencies, the university decided that it needed the extra 25 percent of undergraduate tuition revenue in order to stay afloat under budgetary pressures.⁴⁵ Both the number of years and number of credits for a bachelor's degree are arbitrary numbers, but to change them within the existing system would have big financial and business model repercussions that are not consistent with the existing models' value propositions, resources, processes, and revenue formulas.

Fixed seat time, as a result, has become the core of academic institutions, from measuring teacher workloads to determining academic calendars. It works well for what we call the factory-based model of teaching that emerged in the late 1800s, inspired by the efficiencies of the factory system born in the industrial revolution. Teaching became standardized—done in the same way at the same pace—in order to reach large batches of students. The number of students increased dramatically

with the advent of the microphone, and universities can now fill lecture halls with hundreds of students at a time.⁴⁶ The traditional models of higher education have built up tremendous capabilities in—and financial dependence on—this model of instruction, wherein a professor must pitch the materials at a mid-range level so that everyone—including those who are advanced and those who are struggling—can move along at the same pace. Of course, this often leads to a dissatisfying one-size-fits-none experience. Even in the smallest of seminar classrooms, instructors still struggle to frame a discussion, as they lack an accurate sense of the various skillsets of the students. It is not unusual for days or weeks—in some cases, a midterm—to pass by before an instructor grades an assignment and begins to assess a student's level of understanding.

Release from constraint: Fixed student-learning outcomes

Emerging online competency-based education platforms release learning from the constraints of time-based teaching and deal directly with understandable and assessed proficiencies. Instructors can monitor students' participation and how they learn, as every click is stored as data. Some organizations like UNow have built their platforms in-house, whereas others like Southern New Hampshire University's CfA have built theirs on top of Salesforce, a customer relationship management solution.

Assessment is at the core of competency-based programs. These include formative, summative, and performance-based assessments created by the organizations themselves. Frequent assessments are built into online-learning platforms to ensure that students are progressing successfully through the material and tackling their learning objectives. As an example, CfA subdivides its learning goals into competencies.⁴⁷ In one of the learning goals described as "examining ethical perspectives," the five competencies are described as follows:

1. Can identify key figures in the field of moral philosophy and explain their views
2. Can research an academic topic and summarize findings in writing
3. Can critique and edit his/her own writing
4. Can describe major traditions in moral philosophy
5. Can identify and evaluate ethical arguments.⁴⁸

In these online systems, content is directly aligned to learning objectives such as these. In order for students to prove mastery of a competency, they engage in frequent, low-stakes assessments attached to each learning objective. Different deliverables—projects, quizzes, exercises, and assignments—are interspersed along the way to ensure that students are gaining proficiency before they attempt the final assessment.

Embedded inefficiency: Professor as the fount of knowledge

For centuries, the professor has been the “sage on the stage,” the center of the proliferation of knowledge. The professor, in theory, plays multiple roles as teacher, mentor, tutor, assessor, and content curator. It is difficult to imagine a single person doing all of these things equally well, not to mention also serving as the source of new knowledge—otherwise known as research. An emphasis on research has been built into the professoriate. Most graduate students intent on teaching at the college level take anywhere from six years to a decade to complete their doctoral studies, and the bulk of that time is dedicated to the rite of passage known as the dissertation.

Nearly all traditional four-year schools—most of which are not Research I institutions according to the Carnegie Classification of Institutions of Higher Education—incorporate rigorous standards of publishing into their tenure and promotion processes.⁴⁹ Departments are notorious for ranking research over teaching when making tenure decisions.⁵⁰ Strangely enough, much of this prized research is costly and hidden from the public’s view. Despite the advancements in online technologies, academics still cling to the superiority of print publications and closed-access journals. Jason Mittell, an associate professor at Middlebury College, encapsulates the conundrum concisely, “Universities pay their faculty to write and publish, then must pay commercial entities to sell those publications back to them.”⁵¹ In the humanities, tenure processes exalt the publication of monographs by academic presses. These presses issue a small number of copies, which are, for the most part, purchased by university libraries as opposed to mainstream audiences.

The value system of academic scholarship is so skewed that research findings are hidden from public view. Professors are incentivized to publish their work in gated resources that are markedly closed-access, for open is viewed as inferior. The most reputable journals are often invisible to the mainstream public. Ultimately, as Dan Cohen, executive director of the Digital Public Library of America wrote, “The largest hidden cost is the invisibility of what you publish.”⁵²

This costly faculty research remains in a silo, walled off from broad dissemination to the public. Academics lack access to feedback from people outside of their fields. Because the disciplines have become so narrowly defined, it is often the case that the average article is being read by a handful of fellow scholars in the same field. However great the idea, researchers lack the broader forum through which their ideas might gain traction, have an impact, or become powerful tools for others.

Even more disturbing is how the “publish or perish” mentality leads to the generation of bad research. Particularly in disciplines that are now awash with research, such as the sciences—there are now somewhere between 6 to 7 million scientists in the United States compared to the few hundred thousand in the 1950s when academic research was “still a rarefied pastime”⁵³—the cutthroat nature of academia has led to what *The Economist* calls a dangerous “exaggeration and the cherry-picking of results...scientists have lost their taste for self-policing and quality

control.”⁵⁴ The journal revealed that “[l]ast year researchers at one biotech firm, Amgen, found they could reproduce just six of 53 ‘landmark’ studies in cancer research. Earlier, a group at Bayer, a drug company, managed to repeat just a quarter of 67 similarly important papers.”⁵⁵ Strangely, much of this irreproducible research is being published in leading peer-reviewed journals with some of the highest rejection rates of submissions.

The questionable outputs of research underline the impossible task for the thousands of universities in the United States to produce the same high levels of research. Stanford University President John Hennessy said, “As a country we are simply trying to support too many universities that are trying to be research institutions. Nationally we may not be able to afford as many research institutions going forward.”⁵⁶ Nevertheless, the prevailing logic of the academy is that optimal learning and curriculum design center on original, cutting-edge material delivered directly by the professor. Such logic, of course, ignores the fact that many disciplines have established bodies of research and knowledge—general education courses especially—that are common across most institutions wherein research does not play the same role.

With all of this weight on research, how much do the students matter? Both the needs of students as well as of the market are dismissed in favor of the specialized research interests of the faculty. Andrew Gillen from Education Sector at American Institutes for Research revealed the “perverse incentives” that “likely result in lower-quality teaching,” namely that “current hiring and promotion practices encourage many faculty to consider undergraduates as obstacles in the way of research, to view undergraduate teaching as something to be ‘avoided like the plague,’ and offer advice to junior colleagues such as ‘don’t over-prepare your classes.’”⁵⁷ Even within a state comprehensive university system such as the California State University system, a report estimated that 50 percent of faculty reported that they wanted to do less teaching, and 85 percent reported that they wanted to do more research.⁵⁸ The incentives in traditional institutions have strayed away from teaching to the detriment of student learning.

Release from constraint: Locus of teaching shifts dramatically

Most online universities have done away with tenure, committees, and research and, at the same time, have subdivided the teacher’s role so that the person teaching the online course is separate from the person evaluating the students’ work for grades; these instructors are also different from the people responsible for coaching and mentoring the students along in their academic careers. Online competency-based programs separate the multiple roles of professor into two to four different positions. At WGU, there are student mentors, course mentors, and evaluators. In NAU’s Personalized Learning program, there are lead faculty, who create and maintain the curriculum; mentor faculty, who serve as student coaches; and subject-matter experts who function like tutors, interlocutors, and conversants with the

students; and graduate assistants, who are responsible for assessments and feedback on the student's no-stakes exercises. UNow makes distinctions between its instructional design team, subject-matter experts, assessors, and mentors. The breakdown of the professor's role is not specific to competency-based education programs. The division of teaching labor exists in various online environments that put teaching at the center of their work: a single instructor is no longer pulled in multiple directions but rather has fewer roles to play.

Unlike traditional and other online-learning programs, however, online competency-based models combine this subdivision of roles with rich data on the back-end of the platform in order to deliver one-on-one tutorial experiences at scale. Enabled by advanced learning platforms, instructors can actively monitor the students' clicks and intervene only when necessary. Through frequent online assessments and low-stakes exercises, online competency-based education platforms can capture in very precise ways a student's mastery of concepts and learning objectives. They can alert the instructor if a student is trailing in her studies or struggling with an exercise. The result is a redefinition of what it means to be high-touch.

Caricatures of online learning tend to conjure images of a student alone with a computer—out of reach from vibrant in-person classroom interactions between faculty members and other students. There is nothing innately personal, however, about a professor lecturing to a classroom of students or leading even the smallest of seminars in which any number of students can drift off or get away with being inattentive or not having done the assigned work relevant to the discussion. Online competency-based learning environments, on the other hand, can cater to a student's needs with more personalized learning. In fact, technology can help instructors monitor students' participation better than they might be able to do in a classroom setting. The guesswork goes away, as instructors access a dashboard that reflects immediately the concepts that a student might be failing to grasp. Equipped with an unambiguous profile of a student's progress, instructors can then intervene when necessary, pinpoint, and elucidate that specific troublesome concept for the student.

It is as though each student has a specialized tutor. In American Enterprise Institute's recent outlook on education technology, Frederick M. Hess, Bror Saxberg, and Taryn Hochleitner liken "[w]atching' (with data)" to "any tutor watching closely as a student works on a problem....One-on-one tutoring is about the best way we know to provide intense instruction, real-time customized assessment, and intensive, personalized practice. But it is typically far too expensive to provide at scale."⁵⁹ In an online competency-based model, however, access to rich data on the backend alters fundamental aspects of the teaching and learning process. The frequent assessments generate important data about each student. One tutor can serve many more students at a time because she can efficiently gauge the students' level of understanding and intervene only when necessary. These data-driven interactions between teachers and students actually become both richer

teaching moments and more cost-effective interventions. Some learning platforms even integrate emerging adaptive learning technologies. Ultimately, instructors can guide the learning process in an efficient yet highly tailored fashion.⁶⁰

The technological advancements occurring in higher education will inevitably put pressure on U.S. graduate programs, especially as online teaching roles continue to be subdivided into more specific roles that do not require full-fledged doctoral degrees. By separating the varying and complicated roles that one traditional professor typically plays, organizations will be able to hire educators who do not necessarily have PhDs or expect tenure contracts. With more people available who can meet the specifications of these highly circumscribed roles, will there be different pathways of potentially different durations within doctoral programs that enable students to immerse themselves in either specialized research or online teaching roles? Suffice to say, these are very different capabilities that go fully against the grain of what the resources and processes—faculty, teaching structures, and tenure incentives—that exist in the traditional model of teaching and learning.

Embedded inefficiency: Interdependent structures of academia

For centuries, it was difficult to imagine a source other than a university or college delivering higher education. Over the last few decades, however, the simplicity of fully online universities has made obvious the inefficiencies and the problematic, rigid structure of most postsecondary institutions. Each college has its own interdependent architecture: each facet of the college is designed and made to work only within the brick-and-mortar college campus itself. The intricacy of this set-up is the major reason why it is so difficult for students to transfer credits between colleges. An interdependent architecture results in an interdependence of credits.

The current system of higher education encourages disparate and subjective measures of learning. As Laitinen said, “[L]earning standards and assessments are largely devolved to the level of the individual course. Individual professors often set their own singular standards, deliver instruction, and then measure the students against these standards.”⁶¹ There is, as a result, no useful metric that can translate across institutions, state borders, and companies. Grades are poor indicators of student learning because of severe grade inflation from institution to institution. Today, the grades in almost half of undergraduate courses are A’s, whereas in 1961, only 15 percent of grades were A’s.⁶² There is no agreed-upon standardized unit of learning. If there were, then credits would be much more easily transferable between institutions. An A in one institution’s algebra class would mean the same thing at another institution.

As a result, students are unable to transfer their credits easily between schools and must retake certain courses. The impact of these redundancies cannot be ignored. College tuition costs and fees are soaring, and Pell grants offer less and less relief to students; in 1981, Pell grants covered 69 percent of the cost of tuition, whereas today, they only cover approximately 34 percent despite the increase in

Pell money over that same period of 31 years.⁶³ Students are emerging from their studies with an average of approximately \$29,400 worth of student loan debt,⁶⁴ a figure that is far more troubling when combined with the fact that half of those who start college fail to complete their degrees within six years.⁶⁵ There are now approximately 37 million Americans with some college experience but no degree to show for it.⁶⁶ Even the authors of the College Summit report, who defend a college education as the “best insurance policy against shifting labor markets, unemployment, and under-employment,” acknowledge that failing to complete is the biggest risk of a college education.⁶⁷

There is a perfect analog to higher education’s inefficient credit transfer system in our health-care industry. Personal health records are not actually personal; they are not portable, interoperable, standard-format records that people can take with them wherever they go. Electronic health record systems are generally proprietary—accessible within systems but generally not from points outside the system. It is simply not in the financial interest of health-care providers to enable other providers from different systems to care easily for their own patients.

Similarly in the case of higher education, universities have little financial motivation to standardize their interfaces with one another. One of the few states in the country that has a common course numbering system is Florida. Algebra 1105 is the same across all public postsecondary institutions in Florida. This common course numbering ensures that the credits of students will transfer easily. Unfortunately, however, Florida’s course numbers have little transferability across state lines. When a student transfers to a destination college, it is an accepted practice for individual registrars to decide which courses will count for credit. Part of this, of course, is a financial ploy: students are generally capped in terms of the number of credits with which they can enter, so that the admitting institution can make a certain amount of money off of each student. The financial incentives are clearly not aligned for institutions to facilitate the credit transfer process.

At the same time, the interdependent architecture of most colleges also prohibits the integration of innovations that would speed up degree completion and lessen the impact of students’ foregone wages in the pursuit of that degree. The inability of traditional institutions to evolve toward openness is a complicated transition with which companies in all industries grapple. Companies that are most successful in the beginning are those with optimized, interdependent architectures, but over time and as waves of disruptions sweep through an industry, structures inevitably evolve toward openness and modularization.

As an example, Apple computer—the most integrated company with a proprietary architecture—in its early years made the best desktop computers: they were easier to use and crashed much less often than computers of modular construction; however, when the functionality of desktop machines became good enough, IBM dominated the industry as the leading nonintegrated provider of modular personal computers. Most often, interdependent companies find themselves making products that are too good for their customers, and their market

dominance begins to unravel because customers are no longer willing to pay premium prices for improvements that overshoot their needs. When products become good enough for customers in terms of reliability and functionality, customers are only willing to pay for improved performance along a new trajectory of innovation in speed, convenience, and customization. The basis of competition in a tier of the market changes and forces a gradual evolution in product architecture away from interdependence to modularization.⁶⁸

Release from constraint: The shift to modularization

Competencies lend themselves to being packaged at scale into brief and affordable programs for a rapidly evolving economy. By breaking learning into portable segments or modules—not necessarily courses—that center on specific competencies, learning providers can connect and stack these modules into different series and clusters that can be integrated into different programs for various disciplines. Molly Corbett Broad, president of the American Council on Education (ACE), said, “We are at or approaching a point of significant transformation where you will be able to snap modules together from a wide array of choices, or link them in ways that produce what are sometimes called stackable credentials.”⁶⁹ Online competency-based providers are well equipped to build a multitude of programs for very different industries and do it cost-effectively.

The price point of online competency-based degree programs is already comparable to or lower than community colleges. Most offer simple subscription models in which students pay a flat rate for a certain period of time and can complete as many competencies as they wish: CfA charges \$2,500 per year; UniversityNow’s Patten University (UNow) charges \$1,330 per four-month period for undergraduates; University of Wisconsin’s UW Flex offers one option at \$2,250 for a three-month period; Capella University’s FlexPath costs \$2,000 per quarter on a calendar year; Brandman University’s Bachelor of Business Administration (BBA) costs \$5,400 per year; and WGU charges \$2,890 for six months for most programs. To put this in perspective: most two-year MBA programs can cost around \$150,000 (executive MBAs are often even more expensive). If a student, however, were to take the full two years to complete an MBA through Patten University (and the student could, in all likelihood, finish even more quickly), then she would only pay \$12,480.⁷⁰

Although these rates are for degree programs, many online competency-based providers could easily cull from their repositories of competencies and create strategic bundles of learning that do not necessarily end in a degree or a certificate. Modularization is the key: when learning is broken down into competencies—not by courses or subject matter—online competency-based providers can easily arrange modules of learning and package them into different, scalable programs for very different industries. For newer fields such as big data science, logistics, or design thinking that do not necessarily exist at traditional institutions, these learning

providers could collaborate directly with employers to determine the competencies required and build streamlined learning pathways for interested students. By taking advantage of modularization and advanced technologies, online competency-based education providers can build tailored programs on demand that match the needs of the labor market—all while passing the savings on to the students.

The modularized architecture of competencies also enhances the portability and stackability of credentials.⁷¹ An example of such a credential—now recognized in 42 states—is American College Testing’s (ACT’s) National Career Readiness Certificate (NCRC). The credential measures skills in problem solving, critical thinking, and reading and is endorsed by the National Association of Manufacturers; the National Center for Construction Education and Research; and the Center for Energy Workforce Development.⁷² The Common Career Technical Core, an initiative jumpstarted by the Common Career Technical Core from the National Association of State Directors of Career Technical Education, is trying to establish consistent standards for 16 career clusters by seeking input from industries, businesses, and secondary and postsecondary institutions.⁷³ These are all valiant efforts on the part of associations to create meaningful sets of credentials, but it is not yet obvious how many employers understand and actually use these as hiring criteria. For the credentials to be truly portable and stackable, employers need to understand and see them as having real value. Corporate and industry leaders therefore need to do a better job of identifying and articulating standards that would enable workers to make a more seamless transition into and within the workforce⁷⁴ and collaborate with educators to target the right competencies. There is a clear opportunity for more industry leaders to formalize and validate emerging credentials.

Embedded inefficiency: Knowledge separated from training

The current education system separates learning to know and learning to do. Rather than giving students broad, interdisciplinary problems to solve, colleges and universities channel students through narrow specializations that have become artificially separated from one another. Salman Khan, founder of the Khan Academy, a free online education platform and nonprofit organization, captures the arbitrary nature of this ghettoization of subjects:

Genetics is taught in biology while probability is taught in math, even though one is really an application of the other. Physics is a separate class from algebra and calculus despite its being a direct application of them. Chemistry is partitioned off from physics even though they study many of the same phenomena at different levels. All of these divisions limit understanding and suggest a false picture of how the universe actually works.⁷⁵

Khan blames the “balkanizing habits of our current system” for denying students “the benefit—the physiological benefit—of recognizing connections.”⁷⁶ It is not enough, however, simply to teach students the connections between one domain of knowledge and another. By being presented anomalies and real-world problems, students must be able to connect ideas on their own without necessarily knowing that different solutions come from different disciplines. Identifying how a body of understanding fits together is more useful than understanding the boundaries between disciplines.

All too often, students are unable to make connections between knowledge and real-world applications. Illustrating this disassociation, Harvard Professor Eric Mazur recounted how some of his brightest physics students were unable to make connections between the equations they had mastered in the classroom to real-world physics problems.⁷⁷ A film crew highlighted this application gap by asking newly minted college graduates from Harvard and MIT’s engineering programs to light a bulb with a battery and a wire. Most of them failed to turn on the light.

The dissociation between knowledge and work stems partly from the faculty who, in general, do not necessarily envision their scholarship and specialization within a discipline as having anything to do with training students and equipping them with specific skills for the workforce. Part of this stems from the powerful set of processes in place in the research arm of academia—such as tenure promotion—that encourages basic, non-directed research over applied research. In fact, in Canada, Germany, and Britain, the government’s push for research with more direct ties to industry and businesses triggered protest from university researchers who were resistant to any pressure to show the societal and economic impacts of their work.⁷⁸ In an interesting way, college transcripts reflect this disengagement from the workforce. In their current format, transcripts do little to inform employers of a candidate’s abilities; they serve as a rough sketch of a candidate’s potential and merely list the subjects to which a candidate has been exposed. These imprecise proxies are the closest approximation of student-learning outcomes, as there are no other assessments available of students’ capabilities at the end of a typical four-year college experience.

Employers currently put their faith in the brands of institutions as general indicators of quality without any recourse to useful demonstrations of the outputs of that learning. They effectively outsource selectivity to postsecondary schools: college admissions committees sift through high school candidates’ scores on assessments such as the ACT, SAT, and Advanced Placement (AP) subject tests.⁷⁹ Although these types of big tests abound at the high school level to certify a student’s level of learning, few such assessments or markers exist at the collegiate level. As such, employers are essentially assuming that the candidate has the talent or potential to make it in the company based on demonstrations of learning from when they were 16, 17, or 18 years old.

Release from constraint: Lifelong learning and direct ties to the workforce

Competency-based pathways have the potential to obviate this imprecise recruiting process. The modular structure of competencies makes it easier to create new learning experiences that are tied more directly to emergent fields of study and problems to solve. At UNow, for instance, when a company wishes to teach its employees a new line of inquiry, instructional design teams confer with industry leaders in order to determine the concepts that need to be mastered. They then plan backwards the specific competencies that would feed into this new major or field of specialization without regard to departmental structures. Such collaborative efforts ensure a balance of skills and knowledge as well as an application of competencies into productive outcomes. At the same time, employers are able to test and validate these newer types of learning experiences as active participants in the coordination and creation of those competencies.

Skeptics of competency-based learning worry that employers will somehow end up dictating the requirements for student learning. In editorials around the country, academics in particular are exhibiting extreme territoriality over student learning. It is no surprise that professors are fighting against this shifting reality because the embedded inefficiencies of the university render them unable to adapt to economic realities without viewing those changes as threats to their livelihood; however, turf warfare does little to benefit students who look to postsecondary programs as pathways to a career. Indeed, as Carnevale argued, the economic role of higher education has gradually altered so that postsecondary education has now become the “nation’s workforce development system” and that “[i]n spite of its growing economic importance, our postsecondary education and training system and labor market information systems remain disconnected ... providing information systems linking postsecondary education and training programs with career pathways is desperately needed.”⁸⁰ Despite philosophical concerns about the purpose of a college education, faculty members must acknowledge that students are and will be looking for the direct economic relevance of their studies.

The rising cost of college is forcing students to question the returns on their higher education investments. As a result, the new wave of online competency-based pathways will be especially attractive to students seeking that direct link to the workforce. Not only are these disruptive entrants pushing innovation on price, but they are also offering briefer, more convenient, direct, and personalized pathways to skills that employers can understand and validate.

5

A NEW VALUE NETWORK: INDUSTRY-VALIDATED LEARNING EXPERIENCES

The true disruptive threat of these lifelong learning pathways will become evident if and as they gain traction in different industries and are validated by more and more employers. Direct partnerships that lead to employer-certified learning experiences have the potential to create a separate and possibly even more powerful value network that supersedes the signaling effect of a degree.

As more innovators push for targeted workforce solutions, they will be able to create learning mechanisms that do not need to be validated by national or regional accreditors. Accreditation in higher education is itself a sustaining innovation. Today, it reifies the status quo by drumming up more and more performance indicators tied directly to time-based requirements that do not directly affect student learning. In 2006, the U.S. Department of Education (DOE) called attention to the inadequacies of measuring institutional quality via the credit hour in its examination of the state of postsecondary education,⁸¹ also known as the Spellings Commission report. The report implicated accrediting agencies as doing little besides assessing inputs and processes as opposed to prioritizing student-learning outcomes. Institutional quality is linked to inputs, such as facilities, faculty,

supplies, and equipment, but there are few metrics when it comes to identifying measurable student-learning outcomes. These imperfect agencies are the gatekeepers of Title IV student aid, the primary form of federal support for institutions.

In order to be eligible for Title IV funding, innovators must seek out accreditation from a system that functions like a cartel. Because accreditation is a form of self-governance that higher education institutions run themselves, there is little if any incentive for a panel of institutional peers to enable the entrance of new, outside providers who may be threatening to the existing order. The system rewards maintenance of the status quo. Many innovators today are therefore forced to fit their creations into existing regulations that prioritize fixed seat time. Such retrofitting, unfortunately, has the effect of muting the creative potential of even the most exciting innovations.

Disruptive products require disruptive channels.⁸² If competency-based education programs begin to proliferate and are able to help students make more seamless transitions into and throughout the workforce, then they will be able to validate their brands without having to seek out accreditation. They will create a disruption from the margins—outside of the reach of regulators.

Disruptive innovations rarely succeed through a head-on attack against regulations and the network effects that constitute the power of the incumbents. To illustrate: Southwest Airlines did not disrupt the airline industry by seeking approval in the early 1970s from the federal Civil Aeronautics Board for discount prices on long, interstate routes. Instead, it began flying short routes within the state of Texas, where the federal regulators lacked jurisdiction. Merrill Lynch was able to topple the regulation of bank interest rates because it was not a bank and therefore not regulated by the Federal Reserve when it introduced its interest-bearing cash management accounts. There are dozens of comparable examples. In each case, markets that were dominated by entrenched competitors surrounded by powerful network effects and protected by regulation ultimately gave way to the fait accompli of a new network, and to efficient, safe markets that emerged by circumventing regulation.

Learning from its predecessors in innovation, UNow does not even seek Title IV funding in order to evade completely the bureaucratic quagmire of federal regulatory oversight and its associated debt obligations for students. Indeed, many online competency-based programs are so affordable that students are able to either afford to pay out-of-pocket or cover tuition costs through their employer tuition assistance programs. Providers like Brandman, UNow, and CfA are partnering directly with employers and recruiting students through new distribution channels. By partnering with large companies, these organizations are putting a learning mechanism in place for employees looking to move up the management chain within their companies. Because tuition prices are so reasonable, employees are able to take advantage of their companies' tuition reimbursement programs (sometimes \$5,000, which can often cover the cost of a program) in order to earn a competency-

based degree or improve their skillsets. Employers, in turn, rest assured that their workers are not going into debt in order to pursue an education.

Online competency-based programs will be able to earn the trust of the employer through these unique distribution channels. Employers will be able to observe firsthand whether the quality of work or outputs of their employees are markedly different with these new programs in place. Rather than complaining about the quality of bachelor's degree candidates, employers have the opportunity to build up the skills of prospective workers.⁸³

Herein lies the true disruptive potential of these programs. Because the employer is truly the ultimate consumer of the graduates in training, employers—not accreditors—are the only ones who need to be persuaded. By bypassing the system of accreditation and creating a separate and compelling value network comprised of employers, these competency-based programs have the power to obviate accreditation.

6

COLLEGE DISRUPTED

A critical inflection point is at hand. Nearly half of all newly minted bachelor's-degree holders are either unable to find employment or underemployed.⁸⁴ Two recent Gallup Polls revealed that although 96 percent of chief academic officers believe that they are doing a good job of preparing students for employment, only 11 percent of business leaders agree that graduates have the requisite skills for success in the workforce.⁸⁵ Something is amiss.

Those who scorn vocational training tend to get caught up in its connotations of career education, corporate training, and utility. Vocational training, however, does not necessarily preclude the liberal arts or notions of effective citizenship, well roundedness, or artistry. In fact, as early as 1915, John Dewey railed against the notion that our understanding of vocation be limited to "occupations where immediately tangible commodities are produced": "nothing could be more absurd than to try to educate individuals with an eye to only one line of activity."⁸⁶ Rather, these new competencies embody what Dewey called "a continuous activity having a purpose":

Education through occupations consequently combines within itself more of the factors conducive to learning than any other method. It calls instincts and habits into play; it is a foe to passive receptivity.

It has an end in view; results are to be accomplished. Hence it appeals to thought; it demands that an idea of an end be steadily maintained, so that activity cannot be either routine or capricious. Since the movement of activity must be progressive, leading from one stage to another, observation and ingenuity are required at each stage to overcome obstacles and to discover and readapt means of execution.⁸⁷

In a similar vein, online competency-based education aligned to workforce needs is an “education through occupations” that catalyzes engagement and persistence through recurring low-stakes assessments and leads ultimately to mastery, proficiency, and fluency. Competencies are identifiable learning outcomes with “an end in view.”

This learning pathway is not disruptive simply because it features inventive technology. Rather, it marks the critical convergence of two major vectors: robust advancements in technology and a growing set of nonconsumers of higher education who are not finding what they need to progress through traditional forms of education. Online competency-based providers are relying upon advancements in technology in order to reach an over-served population. Moreover, the technology is housed in a simplified business model that is unfettered by the interdependencies that constrain most incumbent institutions.

Even if traditional institutions could see the benefits of moving to a competency-based system, then they would be fundamentally incapable of changing because their value proposition, resources, processes, and revenue formula hang in a delicate balance that hinders them from addressing potential disruptions. Schools cannot disrupt themselves. They will naturally prioritize innovations that conform to their existing business models. A university would have to revolutionize its scheduling around the belief that students learn at different rates—not en masse—and ultimately move away from semesters, quarters, and credit hours. The constraints are herculean when considering the embedded inefficiencies of institutions. The transformation from time-based learning to competency-based education will most often require the creation of a skunkworks or spin-off project that should not have to fit into the main organization’s processes and values. CfA and NAU’s Personalized Learning are examples of autonomous programs.

Some community colleges are choosing a middle route and experimenting with online competency-based education by converting a single program at their schools.⁸⁸ WGU is guiding 11 community colleges—four using U.S. Department of Labor grants and seven funded by the Bill & Melinda Gates Foundation. Each school will be able to see how the transformation to competencies in one program affects its admissions processes, registrar’s office, scheduling, transcription, accreditation management, information technology services, and all other facets of university operations.⁸⁹ These community colleges are attempting to enact a major transformation from within their institutions. Each program is being developed in-

house with the hope of fitting in with the culture of the existing institution—a formidable task when considering the interdependencies involved. Indeed, the theory of disruptive innovation predicts that if a new-growth and potentially disruptive project is housed within an existing organization and does not have a good fit with the values of the organization, the project will be doomed to fail. The leaders of these new online competency-based programs must have the autonomy to set up the right processes and resources that are essential for the new venture's success. It will be vital to observe the kinds of resistance these community colleges encounter as they attempt to modify programs from within and how they navigate around the embedded inefficiencies of their institutions.

For now, all online competency-based education programs that seek to facilitate a whole new value network for employers and students will operate on the margins of the system of higher education. They will not compete head-on with schools that deliver the 18- to 22-year-old college experience. As a result, the financial health of traditional institutions will remain unaffected by online competency-based education. Established schools will rely on the credit hour for as long as they possibly can. They will continue to view disruptive entrants as irrelevant to their wellbeing because the growth in a new value network does not affect demand in the mainstream markets for some time.⁹⁰

But disruption is a process, not an event. Online competency-based education is an early-stage threat that will strengthen over the years to become a significant workforce solution. As these alternative learning pathways proliferate, we will likely witness a trickle-down effect of competencies on our current system of credit hours. When outside forces such as affordability, flexibility, and faster times to completion begin to take hold outside of academia, the already strained business models of traditional universities will appear less desirable and less relevant to students. All of the efficiencies of online competency-based education will inevitably attract more students, as they see the value of a new network that connects them directly with employers. Employer-validated learning experiences will have tremendous power in altering the status quo.*

Institutions will not be able to cling to the way they have customarily delivered higher education as more students begin to pick and choose their learning from disaggregated online-learning outlets. “[I]nstitutions that are unwilling or unable to incorporate elements of a competency model,” wrote Joel Shapiro, associate dean of academics at Northwestern University’s School of Continuing Studies, “will be forced to defend the value of learning that cannot be easily assessed and demonstrated. That will be a hard message to communicate and sell,

* At the same time, we can imagine that decades from now, there will inevitably emerge a new set of constraints from this particular set of approaches to learning, which will require a new release. Workforce competencies are not the end-game for higher education, but they release learning from major constraints today and enable students to access critical education on-demand.

especially given that students with mastery of applied and technical skillsets tend to be rewarded with jobs upon graduation.”⁹¹

There is talk already of creating new accrediting models that do not look at institutions as a whole anymore but validate parts of the whole—specific programs, providers, or alternative offerings other than degrees. National and regional accrediting agencies, which serve as the arbiters of postsecondary educational quality, are already feeling pressure from policymakers to make their case for relevance. Part of the challenge for accreditors is that there is little agreement on how institutions can demonstrate the quality of student-learning outcomes. In stark contrast, employers can easily measure the quality of online competency-based programs; they will either see or not see a marked difference in the level and outputs of their employees and prospective candidates. We predict, therefore, that accreditation in general will matter less as employer-validated programs gain traction.

The partnerships that online competency-based providers are building with employers highlight Dewey’s “end in view”—the undeniable connection between education and industry. New distribution channels, such as CfA’s growing network of 50 partner companies, acknowledge employers as the ultimate consumers of the students in training. These companies are both looking for new talent and desirous of skilling-up their existing workforce for advanced opportunities within their companies.

When an education technology company like UNow can collaborate with an employer, identify a line of inquiry—a human capital problem to be solved—determine the competencies and customize a program with the requisite modules to get students the right skills, it will have an enormous competitive advantage without needing a U.S. News & World Report ranking. The network effect of industry-validated experiences will hold sway and even supersede the signaling effect of a diploma from an accredited institution. Particularly if more community colleges and lifelong learning mechanisms beyond college take advantage of competency-based education, then credit-hour-based institutions will inevitably—albeit far down the line—feel the pressure to adapt to the changing and more dynamic possibilities afforded by competencies.

Online competency-based education has the potential to provide learning opportunities that drive down costs, accelerate degree completion, and produce a variety of convenient, customizable, and timely programs for the emergent needs of our labor market. What now appear as one-off innovations emerging from the margins have the potential to force all institutions of higher education to think more critically about how they offer learning, justify their costs, and consider whether and how to adapt their curricula to the changing labor market and needs of the workforce.

EPILOGUE: EDUCATION AND EQUALITY

The question remains whether the proliferation of competency-based education programs will somehow lead to a bifurcation of our higher education system in which an elite experience remains a costly residential one—separate from more affordable, training-focused competency-based programs. Such characterizations misrepresent what will be an equalizing force in what is now a strikingly inequitable system.

Social stratification is embedded in our current system of higher education: only a small and privileged set of people participates in the selective, residential college experience. According to the Georgetown University Center on Education and the Workforce, when one looks at the trends of freshmen enrollments since 1994, 82 percent of students who attend the top 468 colleges are white, whereas 72 percent of new Hispanic enrollments and 68 percent of African- American enrollments are in open-access, two- or four-year colleges where completion rates are substantially lower: 49 percent for open-access two- and four-year colleges versus 82 percent for selective colleges.⁹² Only eight percent of those who attend the top 468 colleges come from the bottom income quartile.⁹³ Because of rising tuition costs and fees, those who are able to access a high-quality education are those who can afford to pay for it or those who have access to the right information. Economists Caroline Hoxby and Sarah Turner report in their work on expanding college opportunities for the “missing ‘one-offs’”—high-achieving, low-income students—that students from the bottom quartile of the income distribution for families tend to apply to non-selective schools when they could in fact be applying to elite schools.⁹⁴

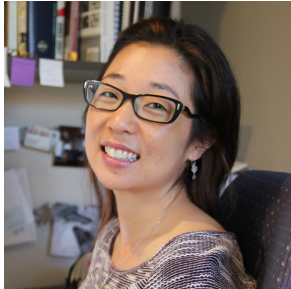
Our higher education system, unintentionally perhaps, polarizes by race and by class, as it channels white students into programs that have greater financial

resources as well as increased odds of completion.⁹⁵ Because credentials have come to serve as a proxy for skill as well as a ticket to enter into the middle class,⁹⁶ students are trapped in a class-based system that demands this credential but simultaneously restricts access to a quality education.

In order to confront the growing inequality within our system, we need to raise the bar for everyone seeking a postsecondary credential. We need a system that prioritizes the demonstration of student-learning growth and outcomes. For the more than 13.5 million students attending schools outside of the top 250 colleges ranked by U.S. News and World Report, we need access to education to be the equivalent of access to quality. Mastery of subject matter via online technologies can displace the importance of place, time, and brand and ultimately put an end to the growing inequality built into our system of education.

Students with obvious and identifiable proficiencies and skills that are related directly to industry needs will be undeniable contenders in the workforce. Online competency-based learning can even out the playing field by taking students to the farthest point possible in their learning experiences, regardless of their starting point, race, geographical location, or family income. With high standards of proficiency, quality, and outcomes aligned with employability, online competency-based education can build a dramatically new value network that changes the rules of the game for the common good.

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About the Institute

The Clayton Christensen Institute for Disruptive Innovation is a nonprofit, nonpartisan think tank dedicated to improving the world through disruptive innovation. Founded on the theories of Harvard professor Clayton M. Christensen, the Institute offers a unique framework for understanding many of society's most pressing problems. Its mission is ambitious but clear: work to shape and elevate the conversation surrounding these issues through rigorous research and public outreach. With an initial focus on education and health care, the Christensen Institute is redefining the way policymakers, community leaders, and innovators address the problems of our day by distilling and promoting the transformational power of disruptive innovation.

APPENDIX A

Shifts in public policy: Major developments

March 19, 2013 – U.S. Department of Education’s Dear Colleague letter

The U.S. Department of Education (DOE) issues a Dear Colleague letter that states its intent to approve certain programs that are not offered in credit or clock hours for participation in Title IV, Higher Education Act programs.

April 16, 2013 – College for America approved

Southern New Hampshire University’s College for America (CfA) is the first university in the nation to be approved by the DOE under direct assessment provisions to participate in Federal Student Financial Aid Programs.

August 12, 2013 – FlexPath approved

Capella University’s FlexPath program is the second university after CfA to be approved by the DOE to offer competency-based bachelor’s and master’s degree programs that use an approved direct-assessment learning model.

September 19, 2013 – H.R. 3136

U.S. Representatives Matt Salmon (R-AZ), Jared Polis (D-CO), and Susan Brooks (R-IN) present H.R. 3136, “Advancing Competency-Based Education Demonstration Project Act,” in which any willing competency-based program is able to submit an application to participate in a demonstration program that will include 20 institutions to be overseen by the U.S. Secretary of Education. The participants must measure learning as opposed to the measurement of time, use direct assessments, and include direct measures of learning such as “projects, papers, examinations, presentations, performances, and portfolios.”⁹⁷ Each participating institution must have a minimum of 100 and no more than 3000 students participating in each program. Each program or consortium of programs will be responsible for an annual report that outlines the meeting of goals, quality assurance, the progress of students toward recognized degrees, the participation and retention of students, the numbers and types of students involved in the programs, as well as “any proposed statutory changes designed to support and enhance the expansion of competency-based education.”⁹⁸ The bi-partisan bill was referred to the U.S. House Education and the Workforce Committee and approved by voice vote on July 10, 2014. The bill was part of a trio of bills passed as a piecemeal reauthorization of the Higher Education Act. On July 23, 2014, the House voted on the bill: 414 votes in favor, none opposing.

APPENDIX B

Descriptions of innovators

Western Governors University

Please refer to our case study on Western Governors University (WGU) titled, “The engine behind WGU: Configuration of a competency-based information system.”⁹²

UniversityNow’s Patten University

Gene Wade, CEO and founder of UniversityNow (UNow), describes deliberately crafting the UNow business model so that federal oversight would not have the power to curb the company’s innovations. The company has therefore foregone accepting any Title IV money. By pricing its programs reasonably and working with employer tuition assistance programs, UNow enables students to pay out-of-pocket for its various programs.

The company owns two different universities: New Charter University, a nationally accredited college, and Patten University, a regionally accredited college. As of March 2013, Patten University has become a strictly competency-based model. In this program, students can complete as many as online competency-based courses as they can during a 16-week period. Although they are technically enrolled in one class at a time to encourage completion, students can start coursework in multiple classes while trying to pass the course in which they are enrolled. Undergraduates are charged \$1,330 per four-month period whereas graduate students pay \$1988 per four-month term in tuition. All of the courses are self-paced, and each degree program is built with an eye toward maximum efficiency; there are no electives at Patten University. Each pathway packs all of the necessary competencies into the most compact set of courses possible—usually 40 courses per degree program. Courses are broken down into competencies. UNow consults with industry councils to determine the necessary competencies that must be covered in specific disciplines.

The core mission of Patten University centers on an outcomes-based system with high standards to indicate mastery of a competency. Each student has the opportunity to test out of a certain competency by taking the pre-final prior to taking the course. This pre-test option is particularly suited for those who may have already taken a similar class or derived the knowledge necessary from past work or academic experiences. If the student passes the pre-final, then she may move on to another course. This enables students to move more quickly toward degree completion. If the student fails, however, then she must take the entire course. A student must then become 90 percent proficient in the eight learning units, or mini courses, within the course before taking the final assessment. The student’s readiness is reflected in a readiness bar—not a progress bar—at the top of the screen, so that a student knows when she will be ready to move on to the final assessment. Of course, if students

are unable to pass the final assessment the first time around, then they may take the final assessment again; however, the readiness bar is intended to set the student up for success for a first-round pass. In general, most students are able to complete approximately one course per month.

One of the most unique aspects of Patten University is its learning platform, which UNow built in-house. Each course's eight modules are built around eight core-learning objectives. The students are therefore able to see exactly how materials are tied directly to the learning objectives in the course. The content in every exercise, quiz, video, assignment, and assessment is tagged and mapped onto a larger knowledge map on the backend so that designers can see exactly how students are making their way through the materials toward mastery. Teachers tag useful course materials, but the students simultaneously crowd source and rate the supplemental resources by voting them up or down the chain. The instructional design teams have also tagged every piece of content in the courses in order to map and better understand how students learn and master specific competencies. After a critical mass of students has passed through a certain course, instructional design teams are then able to sift through the data in order to understand better how students tend to accomplish their learning objectives in the course. The teams are then able to readjust and revise the course in order to offer learning pathways for the next batch of students to accomplish their learning goals more efficiently.

When forming the company, Wade recruited administrators from various institutions such as Kaplan, WGU, and Education Testing Service (ETS) to take some of the most successful ideas from different for-profit and nonprofit educational models and combine them into a new experience. As a result, there are similarities, for instance, among these institutions' distinctions between instructors and assessors. Those who teach the class are different from the set of people assessing and evaluating the students for grades. At the same time, there is a discrete set of advisors who help to motivate the students and push them to complete their work in each course. Students are also grouped together in cohorts based—not on term start-dates but—on their progression through the material so that they can help each other out along the way.

Northern Arizona University's Personalized Learning

Northern Arizona University's (NAU's) Personalized Learning program recently received accreditation from the Higher Learning Commission (HLC) to offer three degree-granting competency-based programs in liberal arts, small business administration, and computer information technology.

Structured similarly to WGU, Personalized Learning relies on lead faculty, who create and maintain the curriculum; mentor faculty, who serve as student coaches; and subject matter experts, who function as tutors, interlocutors, and conversants with the students. Graduate assistants are responsible for assessments and feedback on the student's no-stakes exercises. All of the faculty members participating in this program are currently separate from the existing NAU faculty, as the roles are full-time positions. The program anticipates potentially partnering with the NAU Flagstaff faculty in the future.

In order to be admitted into the program, students must pass, in some cases, up to three assessments that gauge the prospective students' math, analytical, and writing skills. Writing skills are the most important in order to ensure the student's preparedness for the kinds of exercises and assessments included in the program.

There are 120 competencies in each degree program—the equivalent of 120 credit hours. The number, 120, comes from an Arizona state policy and helped the Personalized Learning program also prove to the HLC and the DOE that its degree programs were in some way equivalent to existing degree programs based on credit hours. Prospective students are allowed to come in with a maximum of 64 credits; those credits are then translated and mapped to a database of 120 competencies within the degree program. After consulting with industry councils, lead faculty, and examining numerous course syllabi, the leaders narrowed down each degree to 120 competencies that a graduate of the major should master in order to complete the relevant degree. There are no electives in any of the three degree programs. Although students may not use work experience to count for certain competencies, their experience might enable them to pass more quickly out of some competencies aligned with their work. Once accepted into a program, the student can begin at any time and take as

many competencies as they wish in a six-month period for a flat rate of \$2,500 (in comparison the tuition for students enrolled on campus is approximately \$8,000 per semester). There are no book fees, technology fees, or graduation fees. The tuition cost includes access to library e-books. NAU relies upon its partnership with Pearson and will take advantage of the company Knewton's adaptive learning technologies, once it is fully functioning within Pearson.

Alison Leigh Brown, president of academic affairs at Personalized Learning, leads the project and describes this particular competency-based model as more "interdisciplinary at the granular level" than most other competency-based programs. Brown characterizes everything as being "shot through with the foundation of a liberal arts education"; students are taught to be more self-aware and reflective about society, art, and self.

A core mission of Personalized Learning is to teach students to become autodidacts in a rapidly changing world; Brown explains that they're teaching students proficiency in how to learn so that if they emerge, for instance, with skills in a specific programming language that is no longer as popular, then they will easily be able to adapt to that change and teach themselves how to learn the next skill.

The learning platform is described as a "hybrid" that uses relational databases and combines certain competencies to repeat concepts in different content areas. The designers of this model believe that repetition is the core of mastery. Therefore, at a granular level, the program repeats and reinforces competencies learned earlier in a different field in order to illustrate how that same competency is necessary within a seemingly unrelated field. By engaging in independent research and frequent conversations with mentor professors, students learn to follow their interests and move on to different sets of materials that reinforce their learning. In order to test out of the competency, students must answer 86 percent of their post-test correctly. Students considering graduate school, who need to earn Latin honors, can opt into a mastery test, which is considerably more difficult than the normal post-test.

The most striking element of this particular competency-based program is the university's loyalty to a liberal arts education. Brown describes the process of trying to make the liberal arts degree "beautiful" so that students do not need to choose between a vocational and a liberal arts education.

University of Wisconsin's UW Flex

In June of 2012, Governor Scott Walker and University of Wisconsin (UW) System President Kevin Reilly announced the first competency-based degree program offered by a public university system. UW Flex offers degrees collaboratively between UW degree-granting institutions and UW-Extension. Thirteen universities exist within the UW System, as well as 13 two-year colleges that serve as transfer institutions. UW institutions can choose to participate but are in no way required to do so. UW-Extension—UW System's institutional home for outreach and entrepreneurship—provides educational, operational, and fiscal support. Leading this effort are Aaron Brower, provost of UW-Extension and professor of social work and higher education, and David Schejbal, dean of UW-Extension's division of Continuing Education, Online, and E-Learning. UW Flex opened its doors for admission on November 18, 2013.

UW Flex differs from many of the other competency-based programs emerging because it offers flexible routes to existing degrees at UW. Students who receive a degree through the UW Flex format are receiving the same credential as residential students at those same institutions. Curricular oversight is managed by the same faculty who participate in the same campus governance, as well as the same academic approval processes. At the same time, these degrees differ from the ones offered to residential students because they are neither term-based nor seat-time based. UW Flex's competency-based model is intended to suit a specific audience: working adults with families or other obligations that make it difficult for them to have a campus experience. UW Flex is designed not to take away students already studying on Wisconsin campuses but rather to serve better the students

who have been targeted by out-of-state for-profit and nonprofit online providers who need the flexibility of online coursework.[†]

Nearly 700,000 Wisconsin adults have some form of postsecondary credit, but only 38 percent of Wisconsin residents have a two-year degree or higher. Adults returning to college with some units already in postsecondary education are the prime audience for UW Flex. To align citizens with the state's workforce needs, Wisconsin and UW System have tried to forge a new program that will enable citizens to improve their ability to compete for 21st-century jobs.

The first set of UW Flex programs that opened in November 2013 include UW-Milwaukee's bachelor's degree in nursing, bachelor's in biomedical sciences for diagnostic imaging, bachelor's in information science and technology, and a certificate in business and technical communications. UW-Colleges are offering general education courses across 18 departments that can lead to an associate's degree in arts and science. A total of 10 to 15 programs will ultimately be offered across the UW System institutions.

At the core of UW Flex are quality assessments that capture whether students have mastered the competencies set out for them (the knowledge, skills, and abilities that qualify students for their degree). In order to maximize the affordability of these programs, prospective UW Flex students will be granted credit for prior knowledge via assessments that test specific competencies mandatory for the relevant degree programs. Students do not have to attend classes in a fixed-time environment. Once they have demonstrated mastery of requisite knowledge and demonstrated appropriate levels of skill in applying their knowledge, they can move to the next set of competencies on their way to obtaining their degree.

Because UW Flex degrees have been developed from already existing programs, the standards have been set by the faculty who created the curriculum. And in certain fields, such as nursing, national certification processes already exist that identify the benchmark for mastery. Additionally, UW-Extension has hired full-time assessment and competency-development specialists to support faculty in creating UW Flex curricular material.

The upside of creating such a program within an already existing and well-regarded public system of higher education is that the UW institutions themselves (UW-Milwaukee and UW Colleges in the case of the first set of programs) are already accredited by the HLC. Offering programs in the UW Flex format required HLC to approve "substantive changes" to these programs, which it did in July of 2013. The HLC, in turn, is working closely with the DOE, as it is developing its own processes to grant Title IV financial aid to direct-assessment competency-based educational programs.

UW Flex programs are open access, but admissions are based a self-assessment tool (Flex Fit), followed by personal calls from admissions counselors, to determine:

1. The "fit" between students' interests and the UW Flex programs being offered.
2. What a student already knows and where she stands via pre-assessment exams.
3. Clarifying expectations for success in UW Flex, including whether the student has structures in place (e.g., financial, time management, technology, etc.) to accommodate working productively in the UW Flex format; if not, assistance can be provided in the form of financial aid, time management, and the like.
4. If the student has the motivation to persist in this kind of setting.

Students prepared for the rigors of this competency-based model have the option of choosing between two different pricing models:

1. An all-inclusive three-month option in which students are able to take all the assessments they desire on as many competency skillsets as possible. The flat tuition rate is set at \$2,250 and is targeted for students looking for an accelerated learning program.

[†] Because UW Flex makes this particular distinction between its residential and Flex students, it appears that the program is trying to keep UW Flex from disrupting the campus experience. UW Flex does not appear to have true autonomy to function as a disruptive growth unit, so it is unclear how disruptive this particular online program will be.

2. A single competency-set option in which students looking to study at a slower pace can master one set of competencies in a three-month period for the price of \$900 (not subsidized).

In both options, students have access to all learning materials and “wrap around” support from Academic Success Coaches (ASCs), who provide a combination of academic support, advising, mentoring, and life coaching. This signature element of the program was designed with educational research in mind that demonstrates that returning adult students need this kind of assistance, particularly in self-paced and technologically rich programs. Upon admittance, UW Flex students are assigned a program-specific ASC who contacts them at least once a week throughout their career in UW Flex.

Southern New Hampshire University’s College for America

On April 16, 2013, Southern New Hampshire University’s College for America (CfA) was the first competency-based program in the history of higher education to be approved by the DOE under its direct assessment provisions to participate in Federal Student Financial Aid Programs. CfA is currently only available through its 50 partners, which include companies such as The Gap, Partners Healthcare, McDonald’s, FedEx, ConAgra Foods, Delta Dental, and Goodwill. For \$2,500 per year, employees can enroll in a self-paced online competency-based associate’s-degree program in general studies.

The general studies associate’s degree is made up of 20 goals and subdivided into 120 competencies. Students move through their competencies through a learning platform that is built in-house at Southern New Hampshire University on top of Salesforce.com, a customer relationship management (CRM) solution. Salesforce enables CfA to keep track of and report out all interactions with the student on a dashboard and measure engagement with the student through what the CfA designers have called kudos. Kudos not only measures and rewards student participation, but also helps to alert coaches that a student has not received any kudos in a week.

Coaches play a vital role in the learning process: they help students analyze and accomplish their goals and are able to intervene by email or phone in order to motivate students. The coaches are separate from the subject matter experts, the instructional designers, and the evaluators who assess the final projects for each competency. Students have the option of selecting the blue or purple path in order to demonstrate their proficiency in a subject: blue offers simpler and more projects, and purple entails fewer and more challenging projects.

CfA is beginning with associate’s degrees and then building bachelor’s degrees in communication, business, and health care. Its aim is to target non-degreed, working students—most of whom have been out of school for over 20 years—who need additional skills to continue in the workforce. Many of these employees have access to tuition assistance through their employers, and as of January 1, 2014, CfA will be allowed to disburse Title IV money to its students. Currently, there are no prior learning assessments or transfer credits accepted, but administrators are considering accepting transfer credits for their future bachelor’s programs. CfA students will, of course, be able to build upon their 20 CfA goals from their associate’s degree program in order to reach the 40 goals in the bachelor’s degree program.

The competency-based program at CfA is still very much in its nascence. Through its 2013 pilot program, the designers were able to identify problems and areas that needed improvement for their 2014 rollout. The instructional design teams are working on clarifying directions for the projects as well as rubrics and scoring devices for evaluators; they are concentrated on strengthening the reliability and validity of their assessments. CfA is building e-portfolios as well as a career center for its students. In addition, it is continually improving the coach’s dashboard as well as partner tools so that employers can more readily view student progress. The social interaction between students will be built into the system at a later point in time so that students will be able to participate more easily within their learning communities.

What is most distinctive about CfA is that it is focused on student outputs. By communicating with employers to build and vet its programs to fit the needs of the industry, it is questioning how well the projects map to specific competencies in order to ensure that the projects and competencies are

realistic and targeted: Can students carry these skills forward? Can they progress in their jobs with these competencies? CfA is also looking into more sophisticated labor market tools so that it can create programs for the jobs that exist and are needed today.

The organization has enrolled 800 students since the program began in 2013 and continues to admit students on the first day of every month from its 50 partner employers.

Capella University's FlexPath

Capella University is an online university with over 36,000 students and 43 competency-based programs. These 43 competency-based programs are distinct from the university's FlexPath programs (also fully online and competency-based), which use direct assessment. FlexPath was the second after SNHU's CfA program to receive approval for Title IV eligibility under the DOE's direct assessment provisions.

There are currently only two programs in FlexPath: an undergraduate program in business and an MBA program. Each program is divided into five to eight program-level outcomes, which are then subdivided into competencies. As an example, the business degree has seven program outcomes. One of those program outcomes is to "use appropriate financial models and principles to support decisions." That one outcome is then broken down into six competencies and 37 sub-competencies, which are tested by direct assessments. One course is really a cluster of competencies. As a whole, the business program has over 170 different sub-competencies that are assessed.

This curricular mapping is described as a backward design process by which the instructional designers first consult with employers, disciplinary experts, and relevant licensing boards to determine the standards and exact competencies needed for a student to be successful in her field.

The program currently runs on Blackboard—a learning management system (LMS) that provides course delivery and management, a community and portal system for communication, a content management system for centralized control over course content, and a system to record and analyze student assessment results—but the company is considering other platforms for the next phase of its operations. Distinct from its other credit-bearing competency based programs, Capella University does not curate content for its students in these two FlexPath programs. Students are taught to evaluate open-source content on the web and elsewhere and then are encouraged to "fish" for their own materials (students in existing credit-bearing programs at Capella University are, in contrast, prescribed certain texts and resources). One of the competencies built into this process is the development of students' informational literacy.

The program began in October of 2013 and is rolling out on a quarterly basis based on the calendar year—not the academic year. In this subscription model, students are allowed to take as many courses as they wish in a 12-week period; however, they are enrolled in two courses at a time to encourage completion. Students are asked to determine their own schedules, and based on these timelines, coaches reach out to the students and automatic deadline reminders are sent to the students. The cost for an undergraduate quarter is \$2,000, and MBA candidates pay \$2,200 per 12-week period.

In order to refine their processes and iterate based on student and faculty feedback, the program is offering these two pathways to no more than 100 students per quarter. It is testing its hypotheses and tweaking the technical delivery while also trying to figure out how to scale the programs. It is still learning about faculty loading and how many coaches, tutors, and faculty to assign to each program. One distinguishing factor about Capella University's FlexPath program is that although it is an online program, none of the assessments are automated; faculty members grade all assessments.

Brandman University's BBA

Brandman University, a member of the Chapman University System, serves 12,000 nontraditional students each year distributed among its 26 campuses from San Diego to Seattle and online. Brandman University began experimenting with flipped classrooms five years ago, before it began offering its fully online (credit-hour) undergraduate program, which is now ranked eighth in online education by U.S.

News & World Report. The leaders of the institution saw the move toward competency-based education as a natural extension of the university, but before building its first competency-based online program, Brandman University interviewed 1,000 prospective students about whether a competency-based program would fit their needs. After a significant literature review and market research, Brandman University decided to move forward with the venture.

Brandman University's competency-based Bachelor of Business Administration (BBA) program is a fully online degree program that offers a business core with emphases in four different areas: marketing, supply chain and logistics, management, and information technology. There are on average approximately 60 competencies for each area of specialization in the BBA program. Each competency is broken down into specific learning objectives, which then further subdivide into topics and subtopics.

University leaders first consulted with the U.S. Department of Labor/Employment and Training Administration's Occupational Information Network (O*NET) database, which contains hundreds of occupational definitions to help students, job seekers, businesses and workforce development professionals to understand the national workforce. They sought out professional certifications in order to backwards-map those into competencies for the BBA program. This backwards design process resulted in a table of knowledge, skills, and abilities that formed the blueprint for the degree program. Brandman University also consulted with its own business advisory council, made up of business leaders from companies such as Oakley, American Hyundai, Blizzard, and other Fortune 500 companies in the Irvine, Calif., area to ensure that the final assessments had relevance to real-world problem-solving skills. The competencies were developed with Bloom's taxonomy in mind, so that level 1 skills (which make up approximately 40 percent of the program) deal with basic skills of knowledge and understanding and are assessed via proctored, computerized assessments. Level 2 skills are evaluated through project-based assessments that test the student's application or synthesis of knowledge through simulations and other kinds of performance reviews.

The general education component of the degree program, which addresses applied learning, innovation and creativity, civic engagement, global cultures, as well as integrated learning, bases its competencies on the American Association of Colleges and Universities, Liberal Education America's Promise, Essential Learning Outcomes, and the Lumina Degree Qualifications Profile (DQP). The DQP, in particular, served as the basis for Brandman University to establish 21st-century competencies for its students while also recognizing the need to prepare students for a rapidly changing work environment. The university also worked with professional associations, such as the Society for Human Resource Management and the Institute of Supply and Management, to determine and calibrate its competencies.

Brandman University is partnering with multiple vendors to deliver its BBA program. Flat World Knowledge is building the learning platform; the company will curate all of the digital content and integrate adaptive learning technologies as well as big data analytics. Its team of three instructional design team members and six content managers work directly with the 25 faculty members and psychometrician at Brandman University to create all of the knowledge content for the learning platform. The faculty model at Brandman University will be unbundled into instructional design teams, tutorial faculty, subject-matter experts, and academic coaches who will monitor students' progress and education. Brandman University is also working with Regent Education to build a new financial aid system in order to free it from term-based financial aid awards. The university uses Ellucian Banner, as well as N2N Middleware, so that all of the vendors can work together within the same system.

The BBA program will cost \$5,400 per year or \$2,700 per six-month period. The competency-based BBA program was accredited by the Western Association of Schools and Colleges in November 2013. The college filed for approval for direct assessment from the DOE in March 2014 and is awaiting final approval. The pilot program is set to launch in August 2014 with 50 students from its premier employer partners that include the aforementioned companies, as well as others such as Kia, Converse, Kawasaki, and more. The hand selected employees and students will also be eligible for competitive scholarships for the pilot. Based on interviews and surveys of the students in the pilot program, Brandman University will make improvements and roll out the program to all of its employer partners in

November 2014. The institution will also offer a private loan program before the new financial aid system is functional in January 2015.

NOTES

¹ We are the most educated generation in American history. See Derek Thompson, "The Best-Educated

² As the McKinsey Global Institute notes, "While a diploma or degree still connotes a certain threshold of academic training (as well as personal drive), there is too much uncertainty and variance in outcomes." Mona Mourshed, Diana Farrell, and Dominic Barton, "Education to Employment: Designing a System that Works," McKinsey Center for Government, p. 73, <http://www.mckinseysociety.com/education-to-employment> (accessed April 23, 2013).

³ Mourshed, Farrell, and Barton, p. 68.

⁴ John H. Pryor, Kevin Eagan, Laura Palucki Blake, Sylvia Hurtado, Jennifer Berdan, and Matthew H. Case, "The American Freshman: National Norms Fall 2012," Cooperative Institutional Research Program at the Higher Education Research Institute at University of California Los Angeles, 2012, <http://www.heri.ucla.edu/monographs/theamericanfreshman2012.pdf>.

⁵ "More than 9 in 10 Americans say that getting a good job and earning more money are at least somewhat important reasons for getting education beyond high school. About two-thirds (67%) of Americans say getting a good job is a very important reason for getting education beyond high school. Nearly that many (65%) say earning more money is a very important reason." "America's Call for Higher Education Redesign," Lumina Foundation & Gallup, February 5, 2013, p. 4, http://www.luminafoundation.org/publications/Americas_Call_for_Higher_Education_Redesign.pdf.

⁶ Michael Barber, Katelyn Donnelly, and Saad Rizvi, "An Avalanche Is Coming: Higher Education and the Revolution ahead," Institute for Public Policy Research, March 2013, p. 52, http://www.ippr.org/images/media/files/publication/2013/04/avalanche-is-coming_Mar2013_10432.pdf.

⁷ "Knocking at the College Door: Projections of High School Graduates," Western Interstate Commission for Higher Education, December 2012, p. 2, <http://www.wiche.edu/info/publications/knocking-8th/knocking-8th.pdf>.

⁸ Critics in particular tend to misuse online education as an imprecise proxy for distance learning, correspondence courses, massive open online courses (MOOCs), for-profit institutions, competency-based education, adaptive learning, flipped classrooms, blended learning, gamification, and technology writ large.

⁹ The dynamics of disruption play out in every major industry where there is a technology enabler: Toyota disrupted the Detroit automakers in the automotive industry; mini-mills disrupted the integrated mills in the steel industry; personal computers disrupted mainframes and minicomputers in the computing industry; and now we are seeing mobile devices disrupt personal computers.

¹⁰ Much like in the hotel industry, for a long time, there was no scalable technology driver capable of disruptively carrying the business model of low-cost universities up-market. As an example in the hotel industry, Holiday Inn could never move up-market to disrupt the high-end hotels because if it wanted to move upscale, then it would have needed to replicate all of the costs of those high-end hotels—the concierges, fine dining, and so forth. In replicating those costs, it would have lost any disruptive advantage it had previously.

¹¹ Generally a disruptive entrant does not offer a breakthrough improvement, nor does it even offer a “good” product from the established organizations’ perspective. Despite the seeming inferiority of this new higher education “product” as well as higher tuition rates than what comparable public institutions charged for in-state students, the nonconsumers flocked to these online universities.

¹² See Chris Ross, “Where Have All the Students Gone? Enrollment Trends in Private Sector Higher Education,” Parthenon Perspectives (Boston: The Parthenon Group, 2013).

¹³ The health of an incumbent organization is also captured in the following section on asymmetric motivation, but here is another example of how disruptive innovations can sometimes contribute to the financial health of an established leader in the same industry. Interestingly, even as angioplasty began thriving as a new technology, for a very long time, cardiac bypass surgery continued to grow. The reason was that in their efforts to treat patients with partially occluded arteries, cardiologists discovered many more patients whose arteries were too clogged to be opened with angioplasty—patients whose disease previously was not diagnosed. So heart surgeons felt no threat—in fact, they felt healthy, for a long time. This disruption has been underway for decades, but the surgeons only recently have sensed the threat as the number of open-heart cardiac surgeries has begun to decline.

¹⁴ In an analysis of data from the Institute of Education Sciences, Ben Casselman determines that there were “just over 5 million ‘traditional’ students—full-time students of standard college age enrolled in four-year public or nonprofit colleges—in the fall of 2011. That’s just 29% of all undergraduates.” See Ben Casselman, “Number of the Week: ‘Non-Traditional Students Are Majority on College Campuses,” *The Wall Street Journal*, July 6, 2013, <http://blogs.wsj.com/economics/2013/07/06/number-of-the-week-non-traditional-students-are-majority-on-college-campuses/> (accessed May 13, 2014).

Anya Kamanetz cites that more than three out of four college students today are so-called nontraditional. See Anya Kamanetz, “The College Experience, for ‘Nontraditional’ Students,” *The New York Times*, August 29, 2013 <http://www.nytimes.com/roomfordebate/2013/08/29/should-students-live-on-campus-or-off/the-college-experience-for-nontraditional-students> (accessed on May, 12, 2014). Amanda Ripley writes, “[O]nly a fifth of freshmen actually live on a residential campus.” See Amanda Ripley, “College Is Dead. Long Live College! Can a new breed of online megacourses finally offer a college education to more people for less money?” *Time Magazine*, October 18, 2012, <http://nation.time.com/2012/10/18/college-is-dead-long-live-college/2/> (accessed November 12, 2013).

¹⁵ Gordon Winston, “The Positional Arms Race in Higher Education,” *Williams Project on the Economics of Higher Education* (Williamstown: Williams College, 2000), <http://ideas.repec.org/s/wil/wilehe.html> (accessed February 14, 2013).

¹⁶ Andrew S. Rosen, *Change.edu: Rebooting for the New Talent Economy* (New York: Kaplan Publishing, 2011), p. 1.

¹⁷ Rosen, p. 33.

¹⁸ Scott Carlson, “What’s the Payoff for the ‘Country Club’ College?” *The Chronicle of Higher Education*, January 28, 2013, <http://chronicle.com/blogs/buildings/whats-the-payoff-for-the-country-club-college/32477> (accessed January 28, 2013).

¹⁹ The major category of costs in traditional universities is overhead costs, which are a function of the complexity created by the missions that most conventional universities have chosen for themselves. Even as universities have raised tuition prices year over year, as a whole they are facing economic models that are breaking. The increase in the true cost of higher education has actually been hidden from many students and families over the years because gifts from alumni, earnings from private university endowments, subsidies from state tax revenues for public universities, and federal subsidies for students have been used to mitigate some costs. But universities are exhausting these mechanisms.

²⁰ While the starting point in the creation of a business model is the value proposition, once a business model has coalesced to deliver that value proposition, the causality of events begins to work in reverse, and the only value propositions that the organization can successfully take to market are those that fit the existing resources, processes, and profit formula.

²¹ A formula emerges as the company follows these processes to use its resources to deliver the value proposition. The revenue formula defines how large the organization must become to break even, what kind of gross and net margins it must achieve to cover the cost of its resources, and how rapidly it needs to turn its assets over to achieve an adequate return on investment. The revenue formula in turn determines the kinds of value propositions that the business model can and cannot offer. These four elements of the business model become interdependently locked very quickly. Innovations that conform to the business model are readily funded. Organizations sometimes reject an innovation that emerges to address a new need in the market, but doesn't fit these four elements of the business model. But the organization more frequently co-opts such innovations by forcing them to conform to the business model in order to get funded. When this happens—funding only flows to innovations that sustain or fit the business model—the organization loses its ability to respond to fundamental changes in the markets that it serves. This is what has happened to many universities.

²² Professor Øystein Fjeldstad of the Norwegian School of Management and his colleague Charles Stabell have developed a framework that defines three general types of job-focused business models. Professor Fjeldstad chose the terms *value shops*, *value chains*, and *value networks* for these three types of business models. He has graciously given us permission to use different names for each type. We use the terms *solution shops*, *value-adding process (VAP) businesses*, and *facilitated networks*. Those interested in Fjeldstad's framework should also read C.B. Stabell and Ø.D. Fjeldstad, "Configuring Value for Competitive Advantage: On Chains, Shops and Networks," *Strategic Management Journal*, Vol. 19, 1998, pp. 413–437.

²³ Marcus writes, "Over the last 25 years, the universities' enrollments have collectively grown by 26 percent, while their ranks of full-time administrators have risen 75 percent." Citing Bain & Company, Marcus concludes that "[i]n no other industry would overhead costs be allowed to grow at this rate—executives would lose their jobs." See Jon Marcus, "Administrative Positions Skyrocket at Massachusetts Colleges and Universities," New England Center for Investigative Reporting, May 16, 2013, <http://necir.org/2013/05/16/administrative-positions-skyrocket-at-massachusetts-colleges-and-universities/> (accessed May 16, 2013).

²⁴ Jay P. Greene, "Administrative Bloat at American Universities: 'The Real Reason for High Costs in Higher Education,'" Goldwater Institute, August 17, 2010, <http://goldwaterinstitute.org/article/administrative-bloat-american-universities-real-reason-high-costs-higher-education> (accessed November 11, 2013).

²⁵ Tamar Lewin, "Gap Widens for Faculty at Colleges, Report Finds," *The New York Times*, April 8, 2013, http://www.nytimes.com/2013/04/08/education/gap-in-university-faculty-pay-continues-to-grow-report-finds.html?_r=4&%3E& (accessed April 8, 2013).

²⁶ Ben Wildavsky, Andrew Kelly, and Kevin Carey, *Reinventing Higher Education: The Promise of Innovation* (Cambridge: Harvard Education Press, 2011), p. 103.

²⁷ Peter Schmidt, "Even in New York, Adjuncts' Paychecks Can Take Their Sweet Time," *The Chronicle of Higher Education*, October 29, 2013, http://chronicle.com/article/Even-in-New-York-Adjuncts/142669/?cid=at&utm_source=at&utm_medium=en (accessed October 29, 2013).

²⁸ Jenny Rogers, "Economists Reveal the Golden Ratio of Faculty to Administrators: 3 to 1," *The Chronicle of Higher Education*, November 9, 2012, <http://chronicle.texterity.com/chronicle/20121109a?pg=30#pg30> (accessed June 9, 2014)..

²⁹ Scott Jaschik and Doug Lederman, "The 2014 Inside Higher Ed Survey of College & University Chief Academic Officers," *Inside Higher Ed*, 2014, p. 15, http://www.insidehighered.com/download/form.php?width=500&height=550&iframe=true&title=Survey%20of%20College%20and%20University%20Chief%20Academic%20Officers&file=IHE_ProvostsSurvey-final.pdf.

³⁰ This niche of nonconsumption had always existed, but the advancements in technology made it easier to offer a far more convenient value proposition for adult learners with jobs or other commitments that made commuting to a campus difficult.

³¹ For more information on the concept of jobs-to-be-done, see Clayton M. Christensen, Scott Cook, and Taddy Hall, "Marketing Malpractice: The Cause and the Cure," *Harvard Business Review*, December 1, 2005, <http://hbr.org/product/marketing-malpractice-the-cause-and-the-cure/an/R0512D-PDF-ENG> (accessed June 9, 2014).

You may also refer to The Re-Wired Group at <http://www.therewiredgroup.com/jobs-to-be-done/>.

³² Christensen, Cook, and Hall.

³³ Broadly speaking, students hire higher education as: (a) a transition to adulthood, (b) a way of broadening their views and conceptual understanding of the world, (c) an employment launcher, (d) an employment preserver, (e) an employment changer, and (f) an employment enhancer. In many cases, students are not necessarily the savviest shoppers of higher education or able to articulate that they are hiring higher education for these jobs to be done. As will become evident later though, this changes when the context around higher education alters dramatically.

The initial wave of fully online universities centered on a narrower job to be done that helped students conveniently pursue a degree or certification while working. These nonconsumers, or nontraditional students of higher education, had little need for the transition to adulthood that came with a residential college experience. Another wave of disruptors has since followed and displaced convenience with price as a primary factor in people's decision-making. For-profit groups, like American Public University System (APUS, which includes American Public University and American Military University) and Grand Canyon University, offered low-cost online models. Newer disruptive entrants are pushing innovation on price, which, according to the Parthenon Group, is increasingly displacing convenience as the most important factor for many students in attending college. See Chris Ross, "Where Have All the Students Gone? Enrollment Trends in Private Sector Higher Education," Parthenon Perspectives (Boston: The Parthenon Group, 2013).

³⁴ Ryan Craig from University Ventures Fund described one example in which "[s]everal community colleges have a relationship with Pacific Gas and Electric to deliver a PowerPathway program. For its first class of 70, the program received over 4,000 applications (an admission rate of 1.75%). These community college-delivered 12-week courses have trained over 160 individuals and PG&E estimates its new hires from PowerPathway are six months ahead of other new hires. This translates to a \$30k savings in time-to-productivity." See Ryan Craig, "The Skills Gap and the Spit-Take," *University Ventures Letter*, Vol. III, #21, October 18, 2013, <http://us2.campaign-archive1.com/?u=928797bbde35bedb144213a5c&id=ae1ed0bd32&e=80df6124d4> (accessed October 18, 2013).

Journalist Jon Marcus described another situation in Detroit where despite its 11.3 percent unemployment rate, the city was facing a worker shortage. Two thousand machinists were needed to use or maintain computer numerical control machine tools. In this particular case, the Workforce Intelligence Network and its "coalition of 28 employers, three business incubators, seven workforce development boards and nine community colleges around Detroit use[d] spidering technology to comb through real-time online help-wanted advertisements and analyze what jobs are open and what skills or education they require." See Jon Marcus, "Motown Rising," *United Hemispheres Magazine*, January 1, 2013, <http://www.hemispheresmagazine.com/2013/01/01/motown-rising/> (accessed June 9, 2014).

³⁵ As an example, when AT&T's Bell Labs came out with the transistor technology, there was no way it could compete directly with vacuum tubes, which were the core technology powering RCA's tabletop radios, standalone televisions, and other sophisticated communication devices. The initial, primitive technology of the transistor, which became the building block of what we now call solid-state electronics, was ideal for small devices such as hearing aids or Sony's creation of the pocket transistor radios in 1955. Although Sony's handheld device could come nowhere close to competing with the quality of sound from a tabletop radio, the transistor radio was perfect for a large market of teenagers

looking to listen to their rock music out of earshot from their parents. The transistor radio fit the needs of nonconsumers—people who previously were not able to be served or were not desirable to serve. For these teenagers, the low quality of transistor radios was preferable to their alternative, which was nothing at all. Over time, Sony improved its technology and came out with black and white portable televisions in 1959. Again, the improved technology served a niche of nonconsumers, a significant swath of people who could not afford standalone televisions or who lived in tight quarters that could not accommodate larger appliances. By the late 1960s, solid-state electronics had improved to the point where the transistor could handle the power required to make larger products. Ultimately, the quality of Sony's products improved to power larger televisions and radios and ultimately became good enough that it wiped out RCA from the market.

³⁶ Anthony P. Carnevale writes, "The inescapable reality is that ours is a society based on work. Those who are not equipped with the knowledge and skills necessary to get and keep good jobs are denied the genuine social inclusion that is the real test of full citizenship... if secondary and postsecondary educators cannot fulfill their economic mission to help grow the economy by preparing youths and adults to become successful workers, then they also will fail in their cultural and political mission to create good neighbors, good citizens, and lifelong learners. Increasing the economic relevance of education should, if done properly, extend the ability of educators to empower Americans to work in the world, rather than retreat from it." See Samuel M. Hines Jr., *Creating the Entrepreneurial University to Support Liberal Education* (Washington, D.C.: American Association of Colleges and Universities), pp. 29–30.

³⁷ Chris Sturgis and Susan Patrick, "It's Not a Matter of Time: Highlights from the 2011 Competency-Based Learning Summit," iNACOL, 2011, http://www.inacol.org/cms/wp-content/uploads/2012/09/iNACOL_Its_Not_A_Matter_of_Time_full_report.pdf.

³⁸ Steven Spear, *Chasing the Rabbit: How Market Leaders Outdistance the Competition and How Great Companies Can Catch Up and Win* (New York: McGraw-Hill, 2008).

³⁹ Robert Mendenhall, "What is Competency-Based Education?" *The Huffington Post*, September 5, 2012, http://www.huffingtonpost.com/dr-robert-mendenhall/competency-based-learning-_b_1855374.html (accessed October 8, 2013).

⁴⁰ When these assessments are objective in nature, meaning that they have right or wrong answers, of course the assessment items should be varied.

⁴¹ For a broader discussion of culture, see Clayton M. Christensen, "What Is An Organization's Culture?" Harvard Business School, August 2, 2006 (9-399-104). That note itself draws heavily from the concepts explained in the first three chapters of the following book: Edgar Schein, *Organizational Culture and Leadership* (San Francisco: Jossey-Bass Publishers, 1988).

⁴² Amy Laitinen, "Cracking the Credit Hour," New America Foundation and Education Sector, September 2012, p. 5, http://higheredwatch.newamerica.net/sites/newamerica.net/files/policydocs/Cracking_the_Credit_Hour_Sept5_0.pdf.

⁴³ Laitinen, p. 4.

⁴⁴ Some may argue that fun and the social growth component are a vital part of the college experience, but why then would the fun need to stop after four years instead of five or three? Although four is an arbitrary number, we as a society deem it as a meaningful division between transitioning out of secondary school and entering the "real world."

⁴⁵ Clayton M. Christensen and Henry J. Eyring, *The Innovative University: Changing the DNA of Higher Education from the Inside Out* (New York: John Wiley & Sons, 2011), p. 58.

⁴⁶ As writer Clay Shirky explains, "Without a microphone, manageable class size tops out at about 50. With a microphone, the sky's the limit—you can have huge lectures with expensive profs, and lots of sections taught by cheap TAs and adjuncts...The microphone was a way to lower our cost per student, without lowering the price we charged." Clay Shirky, "Your Massively Open Offline College Is Broken," *The Awl*, February 7, 2013, <http://www.theawl.com/2013/02/how-to-save-college> (accessed January 9, 2014).

⁴⁷ Full disclosure: Clayton Christensen is a member of the Southern New Hampshire University Board of Trustees.

⁴⁸ Email correspondence with Kristine Clerkin, January 8, 2014.

⁴⁹ Note "four-year"—not community colleges. Most community colleges do not require faculty to publish in order to earn tenure. Nevertheless, it is interesting to note that community colleges often move up-market from two-year degree-granting institutions to four-year colleges. The research component makes its way into these schools in an effort to build prestige. Even in California where there is a master plan, the California State Universities have begun morphing into research universities, normally the purview of the University of California system, building up research facilities in a range of fields from agriculture to biotechnology.

⁵⁰ According to Andrew Gillen's report titled, "Selling Students Short: Declining Teaching Loads at Colleges and Universities," the Modern Language Association found a sharp increase from 1968 to 2007 in the percentage of English and foreign-language departments that ranked "scholarship" as more important than teaching when making tenure decisions. The figure more than doubled, the report says, from 35.4 percent to 75.7 percent. Gillen's report was later retracted by Education Sector and the American Council of Trustees and Alumni; however, the retraction was in reaction to faulty data about professors' teaching loads. This particular statement stands on its own. See Sydni Dunn, "Lighter Teaching Loads for Faculty Contribute to Rising College Costs, Report Says," *The Chronicle of Higher Education*, March 21, 2013, <http://chronicle.com/article/Lighter-Teaching-Loads/138025/> (accessed March 21, 2013).

⁵¹ Jason Mittell, "The Real Digital Change Agent," *The Chronicle of Higher Education*, March 4, 2013, http://chronicle.com/article/The-Real-Digital-Change-Agent/137589/?cid=cr&utm_source=cr&utm_medium=en (accessed March 4, 2013).

⁵² Dan Cohen, "Open Access Publishing and Scholarly Values," *Dan Cohen*, May 27, 2010, <http://www.dancohen.org/2010/05/27/open-access-publishing-and-scholarly-values/> (accessed February 14, 2013).

⁵³ "How Science Goes Wrong," *The Economist*, October 19, 2013, <http://www.economist.com/news/leaders/21588069-scientific-research-has-changed-world-now-it-needs-change-itself-how-science-goes-wrong> (accessed October 23, 2013).

⁵⁴ "How Science Goes Wrong."

⁵⁵ "How Science Goes Wrong."

⁵⁶ Nathan Heller, "Laptop U," *The New Yorker*, May 20, 2013, http://www.newyorker.com/reporting/2013/05/20/130520fa_fact_heller?currentPage=all (accessed May 20, 2013).

⁵⁷ Andrew Gillen, "Selling Students Short: Declining Teaching Loads at Colleges and Universities," Education Sector, March 20, 2013, p. 7. This report was retracted after Gillen's calculations were called into question by Physics Professor Charles L. Schwartz from the University of California at Berkeley. Gillen's report was flawed in its interpretation of data from the U.S. Department of Education; he had asserted that at public comprehensive universities, across all tenured and tenure-track faculty, the average number of classes taught per term declined from 4.0 in 1987–88 to an average of 3.25 in 2003–04, an 18.75 percent decline. Had those teaching loads not been reduced, Gillen asserts that at public universities in general, "82 percent of the tuition increase from 1987–1988 to 2003–2004 could have been avoided." Despite the computational errors in Gillen's report, the incentives outlined above still importantly underscore the tradeoffs for professors who must juggle their dual roles as both teachers and scholars.

⁵⁸ Richard T. Serpe et al., *CSU Faculty Workload Report* (San Marcos: The Social and Behavioral Research Institute, 2002).

⁵⁹ Frederick M. Hess, Bror Saxberg, Taryn Hochleitner, "E-Rate, Education technology, and School Reform," American Enterprise Institute, October 22, 2013, http://www.aei.org/files/2013/10/21/-erate-education-technology-and-school-reform_163836868111.pdf.

⁶⁰ Indeed, it is likely that over time, learning platforms will improve dramatically so that these interventions will occur automatically with or without an instructor. Experts from IBM predict that Watson-powered computers will be able to “track and analyse each student’s progress” in order to “tailor curricula” and make learning much “more customized” by providing more precise insight at the right time and when it is most needed. As Vice President of Innovation Bernie Meyerson explains, “Basically, the classroom learns you. It is surprisingly straightforward to do.” See “Classrooms that learn about students are not far away, says IBM,” *BusinessDay Live*, December 17, 2013, <http://www.bdlive.co.za/life/gadgets/2013/12/17/classrooms-that-learn-about-students-are-not-far-away-says-ibm> (accessed December 17, 2013).

⁶¹ Amy Laitinen, “Changing the Way We Account for College Credit,” *Issues in Science and Technology Online*, Winter 2013, <http://www.issues.org/29.2/Amy.html> (accessed March 27, 2013).

⁶² Amy Laitinen, “Cracking the Credit Hour,” New America Foundation and Education Sector, September 2012, p. 6, http://higheredwatch.newamerica.net/sites/newamerica.net/files/policydocs/Cracking_the_Credit_Hour_Sept5_0.pdf.

⁶³ Alexander Zaitchik, “Americans Have Finally Awakened to the Decades-Long Corruption of Higher Education,” *Salon.com*, April 23, 2012, http://www.salon.com/2012/04/23/protesters_furious_new_front/ (accessed March 27, 2013).

⁶⁴ “Student Debt and the Class of 2012,” The Institute for College Access & Success, December 2013, <http://projectonstudentdebt.org/files/pub/classof2012.pdf>.

⁶⁵ J.B. Schramm, Chad Aldeman, Andrew Rotherham, Rachael Brown, and Jordan Cross, “Smart Shoppers: The End of the ‘College for All’ Debate?” College Summit, November 2013, p. 13, <http://www.collegesummit.org/files/SmartShoppersPDF.pdf>.

⁶⁶ Anya Kamanetz, “Dropouts: College’s 37-Million-Person Crisis—and How to Solve It,” *The Atlantic*, December 5, 2012, <http://www.theatlantic.com/business/archive/2012/12/dropouts-colleges-37-million-person-crisis-and-how-to-solve-it/265916/> (accessed October 9, 2013).

⁶⁷ Schramm, Aldeman, Rotherham, Brown, and Cross, p. 13.

⁶⁸ For more on the transition from interdependence to modularization, please refer to Clayton M. Christensen and Michael E. Raynor, *The Innovator’s Solution: Creating and Sustaining Successful Growth* (Cambridge: Harvard Business School Press, 2003) pp. 130–135.

⁶⁹ Jon Marcus, “Conventional College Route Shifts to ‘Education Buffet,’” *The Hechinger Report*, May 1, 2013, http://hechingerreport.org/content/conventional-college-route-shifts-to-education-buffet_11900/ (accessed May 1, 2013).

⁷⁰ As of May 2014, Patten’s rate is \$520 per month.

⁷¹ The authors of the study, “Portable, Stackable Credentials: A New Education Model for Industry-Specific Career Pathways,” describe the portable credentials as “trusted by employers and educational institutions throughout the country and perhaps even the world.” Stackable would mean that students would be “able to earn shorter-term credentials with clear labor market value and then build on them to access more advanced jobs and higher wages.” See James T. Austin, Gail O. Mellow, Mitch Rosin, and Marlene Seltzer, “Portable, Stackable Credentials: A New Education Model for Industry-Specific Career Pathways,” McGraw-Hill Research Foundation, November 28, 2012, p. 7, 20, http://mcgraw-hillresearchfoundation.org/wp-content/uploads/2012/11/PSC_white_paper.pdf.

⁷² Austin, Mellow, Rosin, and Seltzer, p. 20.

⁷³ Austin, Mellow, Rosin, and Seltzer, p. 7.

⁷⁴ University of Wisconsin’s UW Flexible Option program (UW Flex), a competency-based pathway for older students to complete their degrees in a flexible and more expedient manner, was created in order to fill workforce needs. The program is able to assess what students know and need to know by engaging with employers to define the competencies they need and build appropriate assessments to measure whether students have mastered them. At the same time, UW Flex provides employers with a useful tool to recruit, train, and retain talented workers. The core competitive advantage of these kinds

of competency-based programs is that they provide a clear interface with industry needs. See “UW Flexible Degree: A personalized, quality, affordable higher education model to help get Wisconsin working,” Office of Governor Scott Walker, June 2012, <http://www.wisgov.state.wi.us/sites/default/files/documents/6.19.12%20UW%20Flexible%20Degree%20Proposal%20Packet.pdf>.

Cisco has been doing this for years through its Cisco Networking Academy (CNA), a global information and communications technology education program. Since 1996, CNA has served over four million students and delivers over one million assessments per week in a variety of formats. The initial version of the program offered four courses that prepared students to take the Cisco Certified Network Associate (CCNA) examination, a certification test for entry-level networking professionals. The CNA has since grown to cover many more subject areas; nevertheless, the program is built to ensure that when a student successfully completes a course or final exam that she is able to translate that into success on a related industry certification exam. Assessment data must be meaningful and translatable as a true proficiency outside of the classroom.

⁷⁵ Salman Khan, *The One World Schoolhouse: Education Reimagined* (New York: Hachette Book Group, 2012), p. 48.

⁷⁶ This relates back to the stratification of academic departments and the publications produced within increasingly narrow fields of specialization.

⁷⁷ *Minds of Our Own*, Harvard-Smithsonian Center for Astrophysics, 1997, <http://www.learner.org/resources/series26.html> (accessed February 9, 2013).

⁷⁸ See Karen Birchard and Jennifer Lewington, “Shift to Applied Research Triggers Protests,” *The Chronicle of Higher Education*, February 8, 2014, <http://chronicle.com/article/Shift-to-Applied-Research/144659/?cid=at> (accessed February 8, 2014). See also Aisha Labi, “Researchers Resist Pressure to Show Impact of Their Work,” *The Chronicle of Higher Education*, February 9, 2014, <http://chronicle.com/article/Researchers-Resist-Pressure-to/144533/?cid=at> (accessed February 9, 2013).

⁷⁹ Research has now shown that standardized testing “artificially truncate[s] the pools of applicants who would succeed” in college. Chief Investigator William C. Hiss has shown that in a study including “twenty private colleges and universities, six public universities, five minority-serving institutions, and two arts institutions—a total of approximately 123,000 student records at institutions with enrollments from 50,000 students to 350, located in twenty-two US states and territories” that there is a virtually no difference in graduation rates for students who submit or do not submit test scores. Nevertheless, many admissions offices continue to rely on these numbers as sorting mechanisms and reliable indicators of student potential and institutional fit. See William C. Hiss and Valerie W. Franks, “Defining Promise: Optional Standardized Testing Policies in American College and University Admissions,” *National Association for College Admission Counseling (NACAC)*, February 5, 2014, <http://www.nacacnet.org/research/research-data/nacac-research/Documents/DefiningPromise.pdf> (accessed March 5, 2014).

It is also worth noting that the College Board has recently announced major changes in the SAT that will go into effect in the spring of 2016. The test will focus on “relevant” vocabulary words and evidence-based writing, as well as math that emphasizes problem-solving, data analysis, and algebra. In an effort to even the playing field when it comes to test prep, the test company will be partnering with Khan Academy to offer free online test preparation. See “Delivering Opportunity and the Redesigned SAT,” The College Board, <https://www.collegeboard.org/delivering-opportunity/sat> (accessed June 9, 2014).

⁸⁰ Anthony P. Carnevale, “RE: Docket ID ED-2010-OPE-0012,” Georgetown University Center on Education and the Workforce, August 17, 2010, p. 8, <http://cew.georgetown.edu/uploadedfiles/Public%20Comment.pdf>.

⁸¹ “A Test of Leadership: Charting the Future of U.S. Higher Education, A Report of the Commission Appointed by Secretary of Education Margaret Spellings,” U.S. Department of Education, September 2006, <http://www2.ed.gov/about/bdscomm/list/hiedfuture/reports/final-report.pdf>.

⁸² Both Sony and Honda took advantage of disruptive distribution channels. Discount retailers such as Kmart, which had no after-sale capability to repair vacuum tube-based electronic products, were emerging at the same time as Sony's disruptive products. Solid-state radios and televisions constituted the fuel that enabled the discounters to disrupt appliance stores. By selecting a channel that had up-market disruptive potential itself, Sony harnessed the energies of its channel to promote and position its products.

Honda's business took off when it began to distribute through power equipment and sporting goods retailers, because it gave those retailers a chance to migrate toward higher-margin product lines. In each of the most successful disruptions we have studied, the product and its channel to the customer formed this sort of mutually beneficial relationship.

⁸³ According to Michael E. Echols, research shows that employers who invest in an employee's pursuit of a degree will actually have a higher likelihood of retaining those same employees. He cites a "reduced turnover by 55 percent in the studied company where salary actions were related to the awarding of the degree. This result is consistent with findings in retention surveys that list the opportunity to develop and grow as one of the most attractive benefits of a job...the data show increased retention and not greater turnover when policies include salary action and promotion as part of the investment strategy." See Michael E. Echols, *ROI on Human Capital Investment*, 2nd ed., (Arlington, Texas: Tapestry Press, 2005), p. 30.

⁸⁴ "Half of recent college grads underemployed or jobless, analysis says," *Associated Press*, April 23, 2012, http://www.cleveland.com/business/index.ssf/2012/04/half_of_recent_college_grads_u.html (accessed on January 7, 2013).

⁸⁵ "What America Needs to Know About Higher Education Redesign: The 2013 Lumina Study of the American Public's Opinion on Higher Education and U.S. Business Leaders Poll on Higher Education," Gallup, Inc., February 25, 2014, p. 25, <http://www.gallup.com/strategicconsulting/167552/america-needs-know-higher-education-redesign.aspx> (accessed April 1, 2014). Scott Jaschik and Doug Lederman, "The 2014 Inside Higher Ed Survey of College & University Chief Academic Officers," *Inside Higher Ed*, 2014, p. 28, http://www.insidehighered.com/download/form.php?width=500&height=550&iframe=true&title=Survey%20of%20College%20and%20University%20Chief%20Academic%20Officers&file=IHE_ProvostsSurvey-final.pdf.

⁸⁶ John Dewey, *Democracy and Education: An Introduction to the Philosophy* (London: Forgotten Books, June 23, 2012).

⁸⁷ Dewey

⁸⁸ In July of 2013, Broward College became the first college funded by the U.S. Department of Labor to implement a fully online, competency-based associate of science degree with the help of WGU. The \$3.2 million grant is financing a Computer Systems Specialist degree in an "accelerated format" for "veterans, displaced workers and students who are looking to quickly advance their careers." See "Innovative Self-Paced Online Computer Systems Specialist Degree Now Offered," Broward College, July 24, 2013, <http://www.broward.edu/news/Pages/Innovative-Self-Paced-Online-Computer-Systems-Specialist-Degree-Now-Offered.aspx> (accessed on July 25, 2013).

⁸⁹ WGU officials are guiding all 11 of these community colleges to help them create new competency-based credentials as well as transfer pathways into WGU bachelor-degree programs for those students who wish to continue their work from their community college associate's degrees.

⁹⁰ What is more, many established institutions feel as though they have sensed the threat of online education and are responding by investing more money into technology, but these are merely sustaining innovations for their existing value networks.

⁹¹ Joel Shapiro, "Competency-Based Degrees: Coming Soon to a Campus Near You," *The Chronicle of Higher Education*, February 17, 2013, <http://chronicle.com/article/Competency-Based-Degrees-/144769/> (accessed February 17, 2013).

⁹² Anthony P. Carnevale and Jeff Strohl, "Separate and Unequal: How Higher Education Reinforces the Intergenerational Reproduction of White Racial Privilege," Georgetown University Public Policy

Institute and Center on Education and the Workforce, pp. 7, 16,
<http://www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/Separate&Unequal.FR.pdf>.

⁹³ "Education and Preparing the Workforce for the 21st Century."

⁹⁴ Whereas 34 percent of high-achieving, high-income students apply to selective institutions, only 17 percent of the high-achieving, low-income students do. The effects are non-trivial, as the schools that are more competitive invest more in instructional expenditure by an order of magnitude (these expenditures do not necessarily translate into increased outcomes in K–12). More importantly perhaps, students who undermatch potentially lose out on the social capital benefits that come with being part of a network of other elite, high-achieving students. See Caroline Hoxby, "Results of Expanding College Opportunities project," prepared for presentation to Stanford University Economics Department, April 8, 2013. See also Caroline Hoxby and Sarah Turner, "Expanding College Opportunities for High-Achieving, Low Income Students," SIEPR Discussion Paper No. 12-014, Stanford Institute for Economic Policy Research,
<http://siepr.stanford.edu/?q=/system/files/shared/pubs/papers/12-014paper.pdf>.

⁹⁵ We must note, however, that increased odds of completion are tied to the selectivity of the schools. Elite schools, for instance, have the luxury of cherry picking from the best and brightest students and those most likely to complete school.

⁹⁶ Seventy percent of U.S. workers had high school degrees or less—almost 35 percent were high school dropouts—and the vast majority of those workers were positioned in the middle class. See Anthony P. Carnevale, "Education and Preparing the Workforce for the 21st Century," prepared for presentation at the 10th Anniversary Annual Meeting of the Presidents' Forum, October 7–8, 2013.

⁹⁷ "Advancing Competency-Based Education Demonstration Project Act of 2013," H.R. 3136, 113 Cong. (2013), <https://www.govtrack.us/congress/bills/113/hr3136> (accessed March 5, 2014).

⁹⁸ "Advancing Competency-Based Education Demonstration Project Act of 2013," H.R. 3136.

⁹⁹ Heather Staker, "The engine behind WGU: Configuration of a competency-based information system," Innosight Institute, February 2012, <http://www.christenseninstitute.org/wp-content/uploads/2013/04/The-engine-behind-WGU.pdf>