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Commentary

Making Sense of Higher Education's Future: An Economics and Operations Perspective

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The increasing cost of higher education is a growing national concern, and the failure of universities to address it adequately has drawn a great deal of criticism from politicians, the media, and the public. There have been numerous efforts at reform, but few clear solutions. This paper applies lessons from decades of research into the economics and effective design and management of service organizations to propose models for changing the university.

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Ah, the Face of Change: Ch-Ch-Ch-Changes!

Time may change me, but I can't trace time. —"Changes" by David Bowie

The cost of higher education is being criticized from all quarters, in the popular media, and in academic literature and conferences, and it has become enough of a national concern that college and university presidents were convened by President Obama at the White House in January 2014 to discuss the matter. There was little disagreement over the need for change. We need to make the cost of attending a university[1] more affordable. Enrollment is declining, government help is headed in the same direction, and an increasing number of applicants need financial aid. Some at the White House conference and other commentators (Christensen and Eyring 2011, Anderson et al. 2012, Ernst & Young 2012, Etchemendy 2014) feel that moderate reforms over time would address the problem, whereas others (and I include myself in this group) feel that the modern university needs significant change. We need to rethink both our mission and our methods.

Why does this debate matter? University education is a very large industry in the United States. With almost 21 million students and 1.5 million faculty members in more than 4,700 institutions that spend over $480 billion annually (National Center for Education Statistics 2014), it is a big piece of our national economy. Beyond the numbers, the university has historically played a crucial role in shaping our society, preserving our culture, and, increasingly, driving innovation in all disciplines (Geiger and Sá 2008, Wissema 2009). Despite its current problems, the university remains *the* critical rung on the ladder to the middle class in this country (Pew Charitable Trusts 2013) and is increasingly so in developing countries all over the world (see, e.g., Academic Partnerships 2014). Even as the number of college-aged students in America declines, worldwide demand for a university education grows and grows.

Clearly, the university offers a valuable service and, viewed globally, is in increasing demand. So why fix it?

- *Cost:* The rise in tuition and fees has been outpacing overall inflation for decades. This has led the popular press to question whether or not college still is still worth it (*Economist* 2014). Critics cite overall inefficiencies in the United States' higher education sector (Nisen 2013) in a time of dwindling public assistance. When government backs away from funding higher education, it shifts the costs directly to students (Fethke and Policano 2012). Other critics cite the "gold plating" of universities by adding expensive nonacademic amenities, increased government regulation leading to increased administrative costs, pricing distortions caused by federal student aid, etc., as the reasons for these cost increases. Archibald and Feldman (2011) consider all of these criticisms in their book *Why Does College Cost So Much?* Although they find that these criticisms have some merit, they conclude that the main driver of the above average cost inflation in higher education is its low labor productivity relative to other sectors of the economy, the so-called Baumol's cost disease (Baumol and Bowen 1966, Baumol and Blackman 1995). Yes, there may be "dysfunctional economic behavior" (Archibald

[1] I use the word "university" here in the broadest sense, encompassing all the various forms of higher education.

and Feldman 2011, Chapter 7) in universities that is worthy of attention, but this simply cannot explain the long-term cost trends in higher education. The lack of economic productivity growth, as in all other labor-intensive service industries, is the most likely culprit to explain the cost inflation endemic in higher education.

- *Student debt:* As costs have risen, so too has the debt burden for students and their families. To many, this has become a crisis. Overall in this country, outstanding student loans exceed $1 trillion (Best and Best 2014). It was one of the main issues in the Occupy Wall Street movement and in similar protests against the economic order throughout the world. As documented in Best and Best (2014), there are a variety of causes, but there is no doubt that rising costs, coupled with the Great Recession of 2008 that destroyed the ability of families to finance tuition through home equity loans, have for many put a university education out of reach.
- *Changing demographics:* The ethnic composition of the traditional college-age student body is changing dramatically in the United States at the same time that overall enrollment numbers are shrinking, particularly in the Northeast, Mid-Atlantic, and Midwest (*Chronicle of Higher Education* 2012, Western Interstate Commission for Higher Education 2012). This change has caused rating agencies to downgrade the debt of some universities (e.g., Moody's 2014). Declining enrollment raises the cost of borrowing at a time when a growing proportion of applicants are from lower-income families. Many of them are Hispanic, where an increasing number are the first in their families to attend college. This ups the pressure on the university to provide more need-based aid. For example, at the University of Delaware, we have seen a 63% increase in both low-income and first-generation students in the past five years.
- *Skill level of graduates:* While costs and debt are rising, the university is still a good investment *if* a diploma still leads to a significant increase in lifetime earnings. This measure, of course, ignores the considerable nonmonetary benefits of education both to the individual and to society. Viewed strictly as a dollar investment, the data show that a university diploma pays back more than it costs (Pew Charitable Trusts 2013; Best and Best 2014, pp. 131–135), although this return varies by major and the specific institution one attends. Critics of higher education, however, disagree, and perception is overtaking the truth on this particular measure. Universities increasingly feel compelled to justify their economic value to students, whatever the major or the university attended (*Economist* 2014), or the ability of the university to match employer needs with the education provided (Mourshed et al. 2013).
- *Technology:* Last but not least are the continued advances in information technology (IT) and its use in higher education. From massive open online courses (MOOCs) and distance-learning platforms to personalized learning systems, IT continues to hold out revolutionary potential (Wildavsky et al. 2011, Bowen 2013, Lucas 2013, Reif 2014). The venture capital industry has made major investments in companies such as Coursera, Minerva, and others (*Chronicle of Higher Education* 2012, DeSantis 2012). The birth of these for-profit competitors, along with entities such as the Harvard–MIT start-up edX, has generated both excitement and dread in the university community. IT has the potential to become radically disruptive, just as computer-based approaches have upended so many industries. There is both hope and fear that such innovations will end the university as we know it (Christensen and Eyring 2011).

Given this changing landscape, what is a poor university president to do? This question is not new and was addressed almost 15 years ago by Larson and Strehle (2001); most of their insights still hold true today. However, this is not just an academic question for me. I have served as President of the University of Delaware for seven years. For me, the question is both personal and professional. I spent 20-plus years studying the economics and operations of the service sector at the Wharton School as a faculty member and dean. This paper is my attempt to step back from the day-to-day of leading a university and return to my academic roots. I am trying to make sense of the forces confronting the university and lay out a likely path of change based on core economic and operations management principles. As Dick Larson, a noted scholar of services, says,

> In summary, there are important stirrings in education, the World's most important service sector. These go far beyond the "time and motion" improvements of typical IE/OR [industrial engineering/operations research] studies and can extend into the classroom and into the learning process in new and transformational ways. But there is much to be done. We hope that you find the time to join the effort! (Larson 2009, p. iii)

I agree with Dick. Maybe David Bowie is right: we can't go back, but we surely can find the time to create our future!

Designed to Deliver?

One of the basic truths in operations management (OM) is that design drives performance (Ulrich and Eppinger 2011). The design of a product or service drives its cost structure by creating constraints on how it is delivered.

Design determines how competitive it is in the marketplace. A great design delivers efficient value to customers or clients.

So what value proposition does the university offer? What are we attempting to do? Scour enough college websites, admissions brochures, and strategic plans, and you will find blurbs such as "we create lifelong learners," or "this is where you learn how to learn," or "this is where authentic learning happens," or "where learning happens 24×7," among others. All colleges and universities are pitching the promise of critical skills to *learn how to learn for a lifetime*; i.e., this is their value proposition. So how are we doing on designing the university to deliver it?

Consider the typical college campus. Classes are scheduled three days a week for an hour each day, twice a week for one and a half hours, or once a week in three-hour blocks. Room assignments are optimized to fit these scheduled slots, and classes are scheduled to meet student demand (although often class times are more likely to reflect faculty preference). Classrooms are designed to meet the schedule, which in turn is derived from optimizing use of classrooms. In sum, the entire system on a college campus is design to optimize *teaching*, where teaching is defined as being in a classroom, for example, twice a week for one and half hours at a time. Over the decades, we have honed our system to deliver an instructor to a group students. We have built optimized *teaching factories*.

What's wrong with this design? So long as we assume teaching is the same as learning, then this model honors our value proposition. Increasingly, this assumption is being called into question and not just by the emergence of online alternatives. For some kinds of classes, the old design works well, but not for all. Look at the 300-student lecture hall; it's half empty most days as students "vote with their feet." Not all are skipping the class because they are lazy or unmotivated. The best students can find better ways to learn the same information on their own. So, yes, we're teaching, but in a way that has become increasingly disconnected from effective learning.

Consider the following case: A professor believes that the best way for a student to learn a topic—to learn how to learn—is to spend a lot of time working with an interactive (i.e., personalized) learning technology and to attend class only once a week. Of course, we as administrators welcome small innovations, with a few faculty entrepreneurs taking the plunge, but what happens when a significant number of faculty want to try the same thing? Unless the requests could be readily adjusted to a new overall schedule, we don't know how to handle it. Too much variety in learning modalities disrupts our highly optimized, highly engineered teaching system. Classroom scheduling, student course assignment, etc., all become far too difficult to handle.

Or consider the case of a professor who invents an incredible interactive tool for a complex concept, one that utilizes state-of-the-art game technology to let students learn by doing. Suppose this professor approaches the dean (this was me!) and says, "This tool will teach 1,000 MBAs over the course of a week, and thus, I want this to be considered part of my teaching load for the year." Here's my problem: If it's just this professor or even only a handful of faculty who want to do this, it's easy to do. But what if a large number of faculty ask for this accommodation? How do I staff the "teaching factory"? The very definition of faculty effort enshrined in union contracts and tradition, state legislation, accreditation standards, etc., is all predicated on the fact that the hours in a classroom define faculty load. We don't know yet how to account for faculty effort in different ways. In a learner-centric system, the professor's role can no longer be measured simply by hours in a classroom. And the professor who wanted his ingenious tool to count? We couldn't figure it out, so we just gave him extra compensation. It solved the immediate problem, but this approach does not a sustainable system make!

To better deliver our value proposition—to design a university that truly creates lifelong learners—will require a major change in both pedagogical concept and method. Instead of engineering teaching-efficient factories, we need to engineer learning-efficient ones. We need to design and build effective *and efficient* learning environments and processes. I emphasize "efficient" because lowering costs is a primary reason for the change. A *learning-efficient* design is our goal. This shift will not be easy, but it is not unprecedented. It is worth stepping back to see what we can learn from similar service industries such as healthcare and banking, which are making equivalent transitions. Yes, I know that the university is different, but there are valuable lessons to be learned from the service sector.

First, what makes a service different from, say, manufacturing or agriculture? The fundamental difference is that customers/clients of the service are actively involved in its production. Not many of us screwed the bolts on our Toyota, but we all play a role in our healthcare. This kind of collaboration—doctor–patient, banker–investor—defines a certain kind of service delivery. Clearly, education falls into this category; we can't deliver education; students have to seize it, make it their own. In a series of articles (Xue and Harker 2002; Xue et al. 2005, 2007), my coauthors and I define the concept of *customer efficiency*, a trait of high-performing service delivery systems wherein the customer is an active and highly productive part of the process. Xue et al. (2007) demonstrate how this concept can be used in retail banking to ascertain the traits that underlie profitable customers across all of the bank's service delivery channels (branches, ATMs, electronic banking, etc.). The key takeaway from this

analysis and subsequent literature is that focusing the design of such service delivery processes on making the customer highly efficient is one of the keys to success. Translated to the university environment, this means a greater emphasis on learning, as opposed to teaching. It may sound like mere semantics, but this shift will require a tremendous change in all aspects of our enterprise.

Getting people to agree to the need for change is one thing, but try getting them to act! We tend to move only part of the way. At our worst we see new educational methods as a threat, and we fear they will erode our current student base. At our best we adopt a few innovations that do not radically alter our legacy service model. But we can't have it both ways. Frei et al. (1999) describe a retail bank that undertook a major change to reduce costs while at the same time increasing sales. By not focusing the change process on significantly enhancing customer efficiency and only taking marginal steps away from its legacy service model, the bank's profitability suffered, and as a result, the project failed. Half-solutions work the same in the university. Real change means creating a system that efficiently delivers on our promise to help students become efficient learners.

A second major lesson from the service industry is that technology is not, in itself, the answer. Although computers can revolutionize delivery processes and entire industries, there is no straight path to a technologically enabled future. There are plenty of overhyped solutions and failures along the way. It is easy to make an expensive mistake. Take, for example, healthcare. Robot-assisted surgery was widely touted as a major advance, and many hospitals have invested heavily in the fancy new machinery. But recent studies show that the innovation offers no improvement over the work of traditional surgeons (Barbash and Glied 2010, Andrews 2013).

Education has also seen mixed results, as discussed recently by Logue (2012). The fundamental mistake is to believe that technology *is* the answer, instead of remembering that it is simply a tool. It is there to help implement the process; it is not itself the process. This is not a new concept. In summarizing Keller's (1968) oft-cited 1967 President's Invited Address at the American Psychological Association entitled "Good-bye, teacher . . . ," Logue (2012) states,

> In this article he [Keller] essentially advocates breaking down the entire teaching process to its elements, and conducting each of those elements more efficiently. The prime function of the teacher becomes, not to lecture, which is best left to automated means, but to engage in direct interaction with students in support of their individualized instruction.

Logue (2012) concludes her analysis of the history of information technology in education by stating,

> The teaching techniques and tools discussed here have been promoted by behavioral psychologists for the past century. What lessons can we learn from this? One is that it is possible to facilitate learning using the techniques discussed here, such as personalized instruction, without ever having to use the latest (very expensive) technology. There are times when a relatively cheap programmed textbook will help someone learn, perhaps not as well as the best online program, but very well.

In other words, technology is a means to an end, and only one means at that. It is not the end in itself.

MOOCs and other online educational courses have greatly expanded the university's reach by removing the need for geographic proximity, but they have not fundamentally changed the way lessons are taught. The lessons themselves are no different from those in the lecture hall. Many students vote with their feet, never finishing MOOCs (e.g., Ho et al. 2014), just as they walk away from large lecture halls. We know that adults, young and old, learn best by doing, not by sitting and listening. One effort to apply this approach is problem-based learning (PBL), a version of which has been refined over decades at the University of Delaware (for an overview of PBL, see Duch et al. 2001). Research has shown significant improvement on learning outcomes. PBL requires new facilities, such as highly interactive science classrooms, as well as a rethinking of faculty roles (Harker 2013). One thing we have learned is that interactivity only works when it is purposively engineered.

To deliver on our promise, our value proposition, we need to ask a simple question: What is the most effective way for students to learn? It's not about the best way for us to teach, but for each skill, perspective, piece of knowledge, etc., that we want a student to acquire, what is the most efficient and effective way for students to *learn*? Forget flipping the classroom; we need to flip our entire perspective to become truly learner-centric.

It's All About the Curriculum!

Before we dive into the daunting task of becoming learner-centric by reengineering processes, let's first ask the question of what we want the students to know. If we don't know what we want the students to learn, it's impossible to design the appropriate processes that will allow them to efficiently learn it.

More than the processes, it is the design of the *curriculum*, the body of knowledge and skills that we want the student to acquire, which will ultimately decide both the quality and cost of our education. Zemsky (2013, p. 182) makes this point very clearly in his wide-ranging analysis of the current state of higher education:

> What drives higher education's operating cost upward are the nature and organization of its basic functions: the provision of teaching, research, and public service. The organization of these functions determines their costs, including the

> number of personnel required to produce a quality product. From this perspective, the set of activities that make up each function matters most.

Simply put, once you decide what students need to know, you have limited how much process design will matter to both reduce cost and improve quality.

Consider a typical college or university and its general education requirements. This list of requirements is typically fulfilled by the student taking one or more of a selection of possible courses for each required area. How did this list get compiled, and why is this a list as opposed to a single course? We would love to believe that the faculty have taken the time to carefully designate which core courses are the best for fulfilling a given requirement. Alas, as Zemsky (2013, p. 185), states,

> . . . To what extent is the real purpose of a college curriculum today to distribute enrollments in such a way as to preserve faculty slots? . . . It is not a wholly cynical observation to note the faculty shy away from both redesigning their curricula and better controlling the number of credits their majors acquire en route to graduation because they have little appetite for risking changes that will reduce their claim on tenured or tenure-eligible appointments.

Zemsky is simply restating an old principle in OM: excessive product variety kills! Many organizations have failed because they've overextended their product offering. Why would universities be any different?

The typical counterargument that you will hear in universities is that this variety is necessary to maintain quality and that no highly regarded institutions would limit such core courses. This is simply not true. Consider Columbia University, which has delivered a high-quality liberal arts curriculum for decades through the common core (my daughter being one of the generations of Columbians who learned to appreciate the core). Or consider leading business schools such as Wharton or Harvard that successfully deliver a high-quality common core curriculum to almost 1,000 students a year. Several liberal arts colleges also deliver a common core. Quality does not have to suffer, and it can in fact be enhanced, through the use of a common core curriculum.

The for-profit community is also recognizing this fact that a well-designed core curriculum can be both high quality and lower cost. Take, for example, the start-up Minerva Schools at KGI (2014a).[2] Minerva's core curriculum consists of four courses for the entire first year that are focused on the critical thinking skills of formal analyses, complex systems, multimodal communications, and empirical analyses. Students at Minerva will acquire other skills such as competency in two languages other than their own through the use of online and interactive learning technologies. These competencies will be assessed, but Minerva will not teach these skills directly (Wood 2014).

Simply put, the design of the curriculum drives the ultimate success or failure of universities. Thus, it is critical that we take the time to, as Zemsky (2013, p. 186) states, "commit to a designed curriculum."

Before designing a curriculum, we have to ask a more basic question: What basic knowledge and skills does a student need to be successful in his or her career and life? To answer this question, consider the recent book by Erik Brynjolfsson and Andrew McAfee entitled *The Second Machine Age* (Brynjolfsson and McAfee 2014). In this book, the authors look at the advance of digital technologies over the past several decades and consider the economic, social, and political consequences of the continued advance of computing power. In a provocative chapter, they ask the question that we as humans are often afraid to ask; namely, what do humans do better than computers today and in the foreseeable future? Rather than being Luddites, hoping that the machines will go away, Brynjolfsson and McAfee address this question head-on in context of K–12 education:

> So ideation, large-frame pattern recognition, and the most complex forms of communication are cognitive areas where people still seem to have the advantage, and also seem likely to hold on to it for sometime to come. Unfortunately, though, the skills are not emphasized in most educational environments today. (p. 194)

By ideation, they refer to the ability of humans to come up with truly new and useful ideas, "out of the box ideas" as it were! Recognizing the interaction of the complex technical, cultural, economic, social, and political aspects of a situation (i.e., seeing the "big picture") is what they mean by large-frame pattern recognition, and computers are simply not very good at putting all these pieces together. Finally, machines still have a long way to go before they can understand all of the nuanced verbal and nonverbal communications that humans conduct effortlessly.

This lack of focus on these three critical areas is not just a problem for K–12 education; it also affects universities. Look around your campus and ask yourselves what percentage of the students' time is taken up with these three areas? How much of our core curriculum is devoted to ideation, large-frame pattern recognition,

[2] In the spirit of full disclosure, I serve on the advisory board for Minerva.

and complex communication? Do we demand that students in all majors get enough exposure to the liberal arts and social sciences, disciplines that are critical to creative and complex thinking?

The Minerva curriculum is an attempt to directly confront this challenge through its four foundational courses. But we need to recognize it's not just about courses. Ideation—truly creative thinking—does not result from taking a variety of introductory courses but is the product of "deep thinking," the experience of training your mind to confront complex concepts. Learning to learn effectively isn't the result of simply taking courses but emerges from the combination of course work with, for example, undergraduate research projects, working on a start-up business, or other activities that we traditionally don't think of as part of the curriculum.

As we think about our curricula, we also need to recognize that we as humans have another unique trait compared with a computer—we can dream. We are emotional beings, and our dreams can either propel us forward or hold us back. This is not just some lofty concept but, as Bond (2014, p. 33) points out, is the key to success:

> Encourage dreaming? That may not seem like a recipe for success to some, but it is perhaps the most important factor of all. US psychologist Ellis Paul Torrance followed the lives of several hundred creative high-achievers from high school into middle age, among them academics, writers, inventors, teachers, consultants, business executives and a song-writer. He noticed that it wasn't scholastic or technical abilities or achievements at school that set them apart, but characteristics such as having a sense of purpose, the courage to be creative, delighting in deep thinking and feeling comfortable in a minority of one. Most important of all, he thought, was to "fall in love with a dream," preferably at a young age, and then pursue it with intensity.

How much of our faculty time is devoted to students—to mentor them, to help them find their passions, to help them realize their dreams? Rather, we have faculty teach 300-student lectures and then wonder why students often struggle. By carefully designing a curriculum, we can free up faculty time—our most precious resource at a university—to provide that coaching, mentoring, and dreaming that students need to be successful.

What Would Such a Learner-Centric Curriculum and Educational Delivery Processes Look Like?

The short answer to the question posed in the heading of this section is simple: I don't exactly know. Universities are evolving, and evolution requires numerous natural experiments by existing and start-up institutions to truly learn the exact details of what constitutes a cost-effective, learner-centric system. Our current models of universities have been around for centuries, honed to deliver on the teaching-centric model, so we often forget that this existing system is the result of numerous perturbations and trials. That said, I do believe there are broad parameters of the new design that will emerge in any successful system.

First, the curriculum, at least the core and possibly more, will need to be *designed* and not left to either the political wheeling and dealing of the faculty or historical inertia. It will need to focus more than ever on the critical skills outlined by Brynjolfsson and McAfee (2014) above and become less departmentally based. The Minerva model is illustrative of this point (Minerva Schools at KGI 2014a, Wood 2014); consider the text describing two of its four Cornerstone courses from its website (Minerva Schools at KGI 2014b):

> Complex Systems centers on intricate causal forces that shape interrelated networks, including psychological, economic and social systems. Through examination of the various ways multiple factors interact, you gain an understanding of how complex systems give rise to emergent properties.. . .
>
> Multimodal Communications teaches you the fundamentals of effective communication. Through writing, public speaking, aesthetics, design, artistic expression, music, and formal debate you learn the principles of rhetoric and how to apply them based on audience and modality.

What traditional department teaches these courses? The answer: none, and many. It is a radically different design that will require a team-based, interdisciplinary approach to deliver at scale.

And scale is the second key aspect of the curriculum. To get costs under control, to combat Baumol's cost disease, we need to achieve economies of scale and not deliver the entire curriculum via a series of boutique courses. This need to achieve scale in the delivery of a course is not new. This is exactly the reason why colleges and universities built the 300-person lecture halls. Like any other service industry, we need to achieve scale, and thus improve the economic productivity of the faculty member, in a way that actually enhances the quality of the education.

IT is a crucial tool for achieving scale, but it must be used to enable a well-designed curriculum and educational delivery process. Flipped classrooms, MOOCs, personalized learning systems, and other educational

technologies and methodologies yet to emerge are tools that are necessary in order to achieve economies of scale in the delivery of education, but they are not sufficient. We need to confront the structure of our faculty.

Consider healthcare as an example of the type of changes we may see in higher education. In a primary care setting, the costliest resource is the time of the physician. To bend the cost curve in healthcare, we have seen the rapid expansion of the use of nurse practitioners and physician assistants, lower-cost professionals who can provide the basic service to the patient and triage the more complex cases for the physician. We've also seen the rise of telemedicine, where a specialist can treat patients from a distance while partnering with her primary care doctor or a physician assistant.

The differentiation of labor exemplified by the rise of the physician assistant is not a new concept in higher education. In Logue's (2012) analysis of Keller's (1968) suggestions in his famous speech, she notes one important element of Keller's model for education:

> Two types of teachers: classroom teachers these duties include "guiding, clarifying, demonstrating, testing, grading," and other teachers who deal with "course logistics, the interpretation training manuals, the construction of lesson plans and guides, the evaluation of student progress, the selection of [classroom teachers], and the writing of reports for superiors."

This concept goes well beyond use of teaching assistants and contemplates full-time, nontenured faculty who provide the day-to-day, hands-on experience for the students. In Harker (2013), I describe the use of *preceptors* at the University of Delaware who work with the tenured faculty to deliver a PBL-designed science course for first-year students with great success. To make these types of faculty models work, we need to overcome the stigma associated with being a nontenured faculty member and build teams of tenured and nontenured faculty who have deep respect for the expertise each position brings to the enterprise.

We will also need to confront the accounting problem I mentioned previously; namely, what do we define as faculty effort in the educational process? I've seen many innovative attempts to develop interdisciplinary curricula founder on this issue. For example, I was once part of a pilot curriculum where the core consisted of truly interdisciplinary courses, team-taught by two tenured faculty. Educationally, it was a great idea, but it failed because there is no way the university could scale such a curriculum and control cost. The only way to make such a curriculum work is to deliver it via a combination of IT, tenured, and nontenured faculty.

There is one other aspect of achieving scale in the curriculum that is worth considering. Look around your university, and ask yourself how many different versions of introductory statistics are being taught, or an introduction to any of a wide array of topics. If your university is like most, there will be several versions of essentially the same material. Why? The answer that is typically given is that we need to offer courses tailored to the specific needs of our students in that major, a statement that often goes unchallenged. I posit that through the creative use of IT and team-based teaching, we can both achieve scale and provide the customized content necessary for individual majors in a way that both reduces costs and improves the quality of instruction.

But when we consider the need to achieve economies of scale in the delivery of some of our introductory and larger classes, why draw the boundary of our thinking at the doors of our institutions? The use of MOOCs or other online and interactive learning platforms seems worthy of consideration to deliver the basic courses in our curricula, which then allows us to free up faculty time to teach the advanced seminars, supervise undergraduate research projects, and provide the much-needed coaching and mentoring for our students. When I've raised this concept with other university and college presidents, the objection I hear is that we're outsourcing our education! The fact is that for many institutions, we've been outsourcing the basic courses for years. Consider that publishers of major textbooks bundle PowerPoint slides and instructor's manuals full of homework and exam questions with the book, and faculty have been relying heavily on these resources for decades. What we're talking about is the use of better technology to do exactly what we been doing for years.

A different form of outsourcing can be used to preserve access to low enrollment subjects. As we know from experience, some academic subjects see enrollments that are cyclical. Rather than cancelling these classes and majors when enrollments shrink, consortia of universities can be formed to offer such courses via simple distance-learning technology such as video links to multiple classrooms, thus preserving access to these subjects.

This question of how to achieve economies of scale in the delivery of a service by outsourcing the "commodity" components of a process, thereby allowing an institution to focus its attention on delivering the unique, value-added components, is not new. Cachon and Harker (2002) address this issue and specify broad conditions under which competitors in a service industry can be better off by outsourcing parts of the delivery process. In the university context, these conditions are often met, and we are starting to see more of this type of outsourcing. What is not yet clear is what type of institutions will provide these outsourcing services. It could be an existing university of sufficient scale to provide these core courses, consortia of universities who band together to provide

these courses, or a for-profit institution such as Coursera or Minerva who provides this service for a fee. For example, Terwiesch and Ulrich (2014) discuss this outsourcing of courses via an unbundling of course content using the technology underlying MOOCs. However this outsourcing occurs, it is clear that the economics of higher education will require that we move at least part of the way in this direction.

Of course, not all universities will adopt any or all of the changes outlined above because they believe that they have sufficient resources through large endowments to ride through this storm of change sweeping through higher education. The majority, however, will need to carefully consider the change to a more focused, streamlined curricula delivered through a new combination of technology and face-to-face interaction by a different mix of faculty. This movement then allows the faculty to invest more of their time on deeper interactions with students inside and outside of the traditional classroom, and it allows institutions to invest in extracurricular activities such as theater, music, entrepreneurial ventures, and a wide variety of clubs that can teach valuable lessons and life skills. If colleges and universities do not consider such a change, the forces of change outlined previously will simply overwhelm them. Knowing this, the real challenge that faces leadership in higher education is how to get from here to there.

How Do We Get There?

For existing universities to change, I agree with Zemsky (2013) when he says,

> My sorting through the pieces of the story begins with the faculty, who hold the key to a purposeful recasting of American higher education. Alas, too often they, or rather, we, have kept our distance. Having demonstrated little zest for confronting the changes that swirl around us, we have successfully put off recasting how and why we do what we do. The pertinent questions then become, "If not us, then who?" and "If not now, then when?" (p. 92)

Presidents, provosts, and deans come and go; the faculty need to own and drive this change and need to be convinced that the forces of change discussed herein are, in fact, real. There are many skeptics who believe that this simply will not happen (e.g., Christensen and Eyring 2011) because of faculty resistance. If this is true, then the only other option is for new institutions, nonprofit or for-profit, to fill the role of "change agents," and as discussed previously, they are indeed emerging on the higher education landscape.

I do believe that faculty will respond, and you might already see signs of these changes all across higher education. As Zemsky (2013, p. 171) states at the conclusion of his analysis of higher education,

> It is, then, just possible that emerging from this perfect storm are neither battered institutions nor a diminished role for faculty, but rather an enterprise in which faculty, both singularly and collectively, succeed in having scholarship and learning retain their central importance as values to which all of higher education is committed. For this future to win the faculty must be newly willing to reconceptualize their responsibilities—to their institutions, to one another, to their students, and to the communities from which their students come. . . .

However, I do not believe that this change can occur within our existing curricula. Rather, we need to set up experimental laboratories, the type of "skunk works" that are typical in large, complex organizations, in order to nurture this innovation. These skunk works need to be unhampered by the academic bureaucracy that often stifles such innovation in universities and could take a variety of possible forms—for example, a pilot core curriculum, a full-blown experimental college, or a new or modified degree program delivered in a hybrid model of online and face-to-face education. What matters most is that a group of faculty, the "early adopters" of new pedagogical models, needs to be empowered to pursue this innovation by using the best of what we know from cognitive science and educational practice.

To spur on such innovation, leading foundations dedicated to issues of access to higher education and/or concerned about the need to stabilize and grow the middle class should consider an active role in pushing colleges and universities in this direction. People often say that managing universities is like herding cats—i.e., an impossible task at times. But cats are easy to herd if you move their food! If foundations devoted serious resources and effort into pursuing this innovation, innovative faculty and institutions will follow.

Summary

Time, time, time, is on my side, yes it is.—"Time Is On My Side" by Norman Meade (recorded by the Rolling Stones)

With all due respect to Mick Jagger, time isn't on our side. The forces of change confronting higher education are not going away, and we need to act. Universities are vital to our societies, and we need to act decisively to assure their long-term sustainability. Our actions need not result from a sense of panic, but rather, from a deep

understanding that our business model needs to evolve in order to become efficient and effective learner-centric institutions.

I know that many colleagues in the academy react in horror to the phrase *business model* as being too corporate, too nonacademic. The reality is that all organizations have business models: for-profit, nonprofit, governments, and even religious institutions. Zemsky (2013) describes the components of the university business model, and as he states, "Yes, Virginia, colleges and universities have business models" (p. 96).

This paper attempted to use what we know about effective management and design of service delivery processes and institutions to lay out an agenda for change in higher education. We are well past the need to define the problem, and we simply do not need any more heated rhetoric pointing out the issues that universities face today and in the future. What we need is a plan of action and the will and resources to make these changes a reality. There is much more work to do, both conceptually and practically, and I hope this paper stimulates other colleagues to heed Dick Larson's call to get involved in making higher education sustainable and accessible for generations to come.

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