Georgia Tech | Center for 21st Century Universities

The Evolving University:
Beyond Disruptive Change and Institutional Innovation

Keith R. Bujak, M.S.
Center for 21st Century Universities
Georgia Institute of Technology

Paul M.A. Baker, Ph.D.
Center for 21st Century Universities
Georgia Institute of Technology

Rich DeMillo, Ph.D.
Center for 21st Century Universities
Georgia Institute of Technology

Francesco Domenico Sandulli, Ph.D.
Departamento de Organización de Empresa
Facultad de Ciencias Económicas y Empresariales
Universidad Complutense de Madrid

ABSTRACT

Given the rapidly changing environment of higher education, it is increasingly likely that the university of the future will not look like typical present-day institutional arrangements. This paper examines the disruptive forces impacting the delivery of post-secondary (i.e. "University") education and speculates on potential structure and operation of the 21st century university. Successful institutions will be those developing innovative and effective institutional approaches that restructure the learning process, both independently of, and in conjunction with, key external partners. These approaches include establishment of partnerships and collaborations across systems, as well as cultivating relationships with nontraditional educational partners; institutional efficiencies; new outcome metrics; and perhaps most pertinent to this paper, technology solutions, practice and process changes. Critical to this approach is an understanding of the benefits and limitations of technology, especially given rapid technological changes. This paper provides an overview of the landscape of higher education innovation and presents the results of a survey of approaches, partnerships, and technologies that will drive development of future venues for higher education.

INNOVATION/ CHANGE ELEMENTS

The idea of fundamental change in higher education, frequently spoken of in terms of technological or even disruptive innovation, may ultimately be insufficiently radical in the face of rapidly changing technologies and approaches to delivering learning systems. One current model of innovation has change in higher education occurring along several dimensions: 1) institutional change and innovation that make these disruptions possible 2) technologies and approaches within—and beyond—the classroom, 3) practices and processes that enable learners to acquire the necessary skills. These change elements typically demonstrate five characteristics:

- Relative advantage over what is currently done,
- Compatibility with existing values and practices,
- Simplicity and ease of use,
- Trialability to determine the level of uncertainty, and
- Observable results (Rogers, 2003).

As changes occur, tensions develop among three primary factors in higher education: education, per se (content as well as practice), research, and innovation itself (Maassen & Stensaker, 2011). The development of national and supranational accreditation schemes, for instance, entrenched as they are in traditional notions of education, could come into conflict with innovative educational reforms. The increasingly prevalent push toward specialized basic research results in a decoupling of research and teaching despite these two forces being mutually dependent upon each other for funding and resources. And sources of funding, not always disinterested, can impact educational innovation, particularly as industry-sponsored research tends to be more applied.

Just as important as the elements that drive change is the context in which we view change and innovation. In a particular example, an advanced sociotechnical system was developed to revolutionize the educational experience. Known as *Atrium*, it incorporated person- and technology-centered innovations.

> *Atrium combined technologies such as multiple data projectors, writable surfaces, interactive sound and lighting, and movable furniture and walls. Many computers were embedded into the space and used to drive the projectors; laptops were also available for students' use. The space was very flexible. […] the configuration was adaptable; with many projectors in the space there was no 'front', or focus, for students' attention. The aim of the design was therefore to produce a technology-driven (but not technology-dependent), totally flexible space which could be configured for a wide range of innovative teaching and learning experiences such as immersive environments, observations of teaching practice, collaborative work, exhibitions and presentations.* (Whitworth, 2012)

The experiment was a failure, at least according to the operational definition of success. Researchers found the experiment both effective and popular among students, yet those who measured its success proclaimed that it was a failure. Academics struggled to accept it, and it lacked the necessary managerial support, ultimately leading to poor acceptance at the university level. Despite this outcome, it helped students, and from that perspective it was successful. However, innovative

change is unlikely to come in these sophisticated, multi-faceted packages, but rather in the form of small, specialized adaptions of current resources and practices.

Our proposed disruption framework starts with the idea of the importance of institutional innovation and expands it by drawing upon some ideas proposed by Zuboff, (2010). Zuboff provides examples of companies delivering radically new products/ideas not of *innovation*, that is improvements in the frameworks of delivery of services, but rather *mutations,* that is the creation of new frameworks or approaches for delivery of services. This approach encompasses the idea that radically new delivery modes of higher education is not equivalent to implementation of technological innovation, but the fundamental shift in the construction of higher education.

MUTATION AND DISRUPTIVE INNOVATION

A wide array of actors—faculty, instructors, NGOs and foundations, researchers, and governments—is exploring new ways to engage students, both within and beyond the walls of the classroom. Information and communication technologies (ICTs) make new interactions possible between teacher and student, between student and material (e-accessibility), as well as among students themselves. C21U posits that these disruptive technologies will meet students at their level in an always-connected society. These technological innovations—coupled with a willingness to rethink the construct and delivery of higher education—shift from the idea of the provision of services to the customization of learning opportunities at a lower cost. Radically new ideas of education, akin to the deployment of mass production (the Model T) or of the iTunes ecosystem, are upon the horizon.

Higher education is ripe for mutation. The services provided are desired by many but affordable to few. The organizational mechanisms can be replaced by more flexible, responsive, low-cost approaches. There are assets that operate beyond the sphere of administrative influence. These and other factors create a gradient that motivate learners to find other sources to meet their needs (Zuboff, 2010). In a changing economy, providing individualized experiences can increase the value learners receive. Higher education can adapt to these changing circumstances by dynamically connecting learners to draw on their strengths. The focus must remain on meeting the needs of the individual.

The following sections present examples of innovative approaches to instruction and learning facilitation that aggregated, may lead to novel system mutation and change.

Institutional Change Agents

Institutions of higher education must change in response to globalization, cultural and and technological factors, and provide students with more general skills while offering students opportunities that go beyond traditional classroom teaching and learning (Teichler, 1999). Higher education, like most complex systems, comprises an array of contributing elements. Change results from disruption of established relationships, linkages, and practices. The present system has served well in the delivery of higher education, but examples from other institutions—entertainment media, book publishing, and content delivery—point toward a future in which higher education will mutate into a wide array of options, alternatives, technologies, and practices driven by the needs and choices of the learner.

Institutions do not function in a vacuum. With increasing globalization, governments, corporations, NGOs, and multinational entities will demand more top-down standardizations of content and structure from institutions of higher education by guiding efforts in some fields and exerting pressure on accreditation organizations (Dew, 2010). Conversely, user/learner driven trends suggest that in parallel with the standardization of domain specific bodies of knowledge, the certification/learning process itself will become more individualized with material, techniques, and pacing matched to the needs and desires of the individual learner.

Non-Governmental Organizations (NGOs)

Since the 1970s, some NGOs—both internationally, such as the World Wildlife Fund, and national programs, such as the Forum for the Future in the UK—have undertaken educational initiatives, including environmental education (Blewitt & Cullingford, 2004). In fact, before ICT development in the [African] sub-continent became a key focus of foundations, multilateral organizations, NGOs, and private businesses, it was conceived of and explored in university settings (Teferra, 2006), although 70-90% of the research activities are funded by these entities (Teferra & Altbachl, 2004). Information technologies and new openness to collaborative activities have resulted in innovative, multidisciplinary, and trans-institutional collaborations. For nontraditional programs, such as those in global citizenship and education for sustainability, universities must develop partnerships with NGOs, as well as other non-academic institutions (Blewitt & Cullingford, 2004).

NGOs have long attempted to respond to global conditions that fit within their remits. For example, partially in response to the apartheid politics of the 1960s and 1970s, NGOs began to focus on improving the educational opportunities of black South Africans in the 1980s. Initiatives included linking students with the University of London and improving K-12 teacher preparation programs, resulting in salary increases for teachers (Fehnel, 2006). Not only did these newly trained teachers gain more qualifications, they also received greater attention from other organizations aimed at improving their condition.

In practice, the fragility of NGOs make them potentially tricky partners, as they must often rely on volunteer support (Efird, 2010) or unpredictable funding streams. For example, an embargo in South Africa by education department officials on private-public partnerships ended the partnership between a distance education NGO and a public university. The partnership focused on 'open leaning option' in science and math (Fehnel, 2006). In Ethiopia, although national NGOs have gained acceptance as speaking of/for/with the people, international NGOs are often seen as neo-colonization forces aimed at reproducing and importing foreign education policy (Pillay, 2010). Perceptions on the part of those who wield control over NGOs and those who receive potential benefit from them influence their effectiveness.

Cross-national analyses of international NGOs suggest that they are instrumental in improving secondary enrollments, students-to-teacher ratios, persistence to grade 5, and female-to-male ratios in third world countries (Schafer, 1999). In the area of environmental learning in China, NGOs have played an important role in offering hands-on experiences (Efird, 2010). This relationship also extends to postsecondary work: of 90,000 students who took the college entrance exam in Shanghai, one third

of them failed and many turned to nongovernmental colleges. These organizations face challenges not experienced by government-run colleges, such as the need to compete for students and qualified teachers and the complexities of dealing with financing and foreign investments (Xiao, 2001). Although NGOs often pursue goals geared toward the social good, they face many challenges in the pursuit of a sustainable model.

Foundations

In the United States, foundations play a significant role in supporting innovative social activities and research. For example, the Bill and Melinda Gates Foundation was formed from two separate, but related, philanthropies, at the time creating the largest private foundation in the country with a $17.1 billion endowment focused on enhancing learning and healthcare (Schneider, 1999). Although a lot of money is often directed toward technical issues and STEM education, the William and Flora Hewlett Foundation gave $7.5 million toward liberal arts education. The research focuses on data collection for understanding effective liberal arts approaches (Van der Werf, 2001). These examples demonstrate how foundations represent substantial revenue streams that can change the course of educational initiatives.

Foundations are not without their uncertainties, however. Foundation funding has declined somewhat in recent years, partially as a consequence of the global economic slowdown. Another tension comes from the objectives and expectations of the various system actors. Foundations have complained that institutions of higher education (IHEs) are too insular and bureaucratic, while IHEs, in turn, have complained that foundations are short-sighted and lack understanding about the workings of university research (Bacchetti & Ehrlich, 2006). Suggestions for repairing the relationship involve openness, collaboration, external review, professional development, and active engagement and communication.

A number of reasons for reduced foundation support have been proposed, including:

- Lack of common goals for innovation,
- Little system innovation,
- Few measurable results, and
- Imperceptible need (Marcy, 2003).

Additional observations regarding changes (Bernstein, 2003) in the nature of funding of IHEs from foundations:

- Much of recent funding decreases have been *alumni* donation, not foundation support.
- Although giving has not decreased, the rate of giving is slowing, but this is considered normal.
- Although some big names have decreased their support (e.g., the Bill and Melinda Gates Foundation), some have increased support (e.g., the Ford Foundation) and there are new foundations on the rise (e.g., the Lumina Foundation).
- The generous funding during the 1990s was very much an aberration but was not expected to decline (Winbush, 1996).

- The relative cuts for higher education have been higher compared to other related areas (e.g., schools, libraries), but the cuts have been nominal.

Not only the structure but also the targets of foundation funding have changed to some degree. For example, internationally, four foundations initially gave $100-million (the final amount was $440 million) in a renewed interested in sub-Saharan Africa's somewhat precarious higher education system. The move was considered unexpected given the continent's low literacy rate; however, the efforts were expected to improve economic and democratic initiatives in the countries (Bollag, 2000). Although the effort is cited for improving e-learning, facilities, and opportunities for many, the partnership dissolved in 2010 due to changes in leadership, a lack of clear goals, and inefficiency (Wilhelm, 2011). Recipients of foundation funding and those who receive the iterative benefits cannot expect funding to always be available, even if they money has yet to run out.

Foundations might be especially efficacious if they focus on the generation and cultivation of knowledge about how to solve the problems they are tackling, or "educational capital." This can be achieved by entering partnerships with IHEs, but foundations are often reluctant to do so because measurable outcomes can be hard to realize (Fleishman, 2007). Colleges and universities must address some of the concerns of foundations, including a low number of Americans attending IHEs, underrepresentation of minorities, and the expectation of nontraditional students to attend traditional institutions (Payton, 1990). A dynamic partnership between foundations and IHEs is necessary to support common goals.

Public Sector (government)

The majority of public university expansion in the U.S. since the 1890s occurred prior to WWII, with the increase in high school completion among students cited as one of the major driving factors (Goldin & Katz, 1998). Some argue that the distinction between public and private sector initiatives is a false dichotomy and that bridging this gap can lead to the benefit of both (Whitchurch, 2010). Perhaps the distinction between public and private institutions should be based not on the organization that controls the institutions, but rather the good produced by the institutions. These goods can be both public and private, and can shift between the two (Marginson, 2007). But commoditizing public education "may have dangerous implications, replacing academic values by commercial considerations, social concerns and purposes by individual interests, and long term needs by short term demands" (Tilak, 2008). Further, a rapidly expanding educational system drives out the less educated from the political system. This effect might be temporary; the associated cognitive frameworks will propagate through the population and impact the less educated (Kamens, 2009). Public support for both public and nonprofit private IHEs might be considered unusual given the private financial benefits earned by those who received a higher education, but it is found to be economically efficient (Courant, McPherson, & Resch, 2006).

From around the world, there have been many examples of successful public sector ventures, if for nothing other than a learning experience.

- American University of Bulgaria was setup to promote democracy in Eastern Europe. It was founded in 1991 as a joint effort between Republic of

Bulgaria, the city of Blagoevgrad (where it is located), the Open Society Institute, and the University of Maine. In 2007, it was the largest United States Agency for International Development (USAID)-sponsored institution in the Balkans (Amthor & Metzger, 2011).

- In Senegal, involvement with non-formal education experiences increases people's likeliness of contacting public figures about personal and social issues. Here, women are over-represented in non-formal education because of their exclusion from formal education (Kuenzi, 2006).

- Since the 1980s in the Netherlands, the typical model of state-governed institutions of higher education has been changing. State regulation and academic self-governance are being replaced with "new public management approaches, communicative planning, and network approaches." These changes are occurring along side of the traditional management approaches, but they represent only the most state-of-the-art changes (De Boer, Enders, & Leisyte, 2007).

- In Britain and France, governments were instrumental in expanding market relationships with international students, both from developed and developing countries; however, the universities themselves were somewhat resistant to this change (Dodds, 2009).

- In Kazakhstan, there has been an initiative on the part of government to liberalize the higher education system. Benefits from this change include filing the gaps in a developing economy and catalyzing changes in higher education, but there are concerns about uneven academic standards, public funding, and social inequity (Tolymbek, 2005).

- In Malaysia, public universities are considered superior to private colleges, while families consider attendance at a private college only after efforts to gain enrollment in a public university have been exhausted. Public universities are superior in terms of teaching quality and research opportunities (Wilkinson & Yussof, 2005).

- Although marketization of universities and reduction in public control is occurring globally, the driving forces might be very different and should be understood on a local level. The force driving changes in Britain, for example, are different from those in China (X. Zhao, 2010).

Other (private sector/industry groups)	The landscape of higher education is changing drastically at the whim of the market. In the early 2000s, there was a consolidation of for-profit colleges, due in part to the success of the larger, publicly traded systems. Examples include Sylvan Learning Systems spending $26 million for a majority stake in Universidad Europa in Madrid; Kaplan Colleges purchasing the Quest Education Corporation for $165 million (Borrego, 2001). Institutions of higher education might consider adopting practices from private sector companies, but these practices must be adapted given the different context in which higher education operates (Tarí, 2008).

Worldwide private funding of education has rapidly increased in recent years. Private financing generally plays a smaller role in richer nations (Bollag, 2007). In the U.S., privately-funded loans are necessary and rapidly growing as they help to improve the skills of the workforce, lower unemployment, increase tax revenues, and engage citizens (Nelsen, 2004). Initial findings suggest that in markets with newly established or weak private sectors, public funds tend to be channeled to private institutions indirectly, while those with more established private sectors receive funds through a mix of direct and indirect channels (Salerno, 2004). In response to concerns raised about unfair practices, the U.S. Consumer Financial Protection Bureau is clamping down on regulating private loans and focusing on consumer literacy, data collection on the use of private loans, and protection against predatory lenders (Dervarics, 2012).

There are many examples from around the world that show how private entities can and do influence the path of higher education:

- In Chile, there has been a surge in privately governed institutions, such as those with religious, business, and military organizations. These affiliations seem to influence the mission or focus of the institution, but this affiliation does not appear to help diversify the higher education system in other ways, such as prestige, curriculum, and tuition (Bernasconi, 2006).

- In Argentina, diversification of higher education is occurring, but despite burgeoning public enrollment, enrollments in private universities are stagnant. Private institutions are finding their niche in specialized programs and elite statuses (C. C. De Cohen, 2003).

- In Kenya, as private universities were developing, they struggled to maintain themselves while competing against the more affordable public universities. Without the necessary revenue, private universities struggle to achieve significant efficiencies for an effective business model (Eisemon, 1992).

- In Portugal, there has been a recent increase in private sector activity, and while private universities offer great potential, they must be steered away from focusing on short term goals and strategies (Teixeira, 2008).

- In Indonesia, although private higher education has driven growth, it has the potential to exacerbate issues relating to "quality, equality, and regulatory capacity" (Welch, 2007).

Although these examples demonstrate that the market for innovation in higher education is helping to stimulate a wide range of new alternatives, technology coupled with new methodologies for education and learning processes promise more creative (and perhaps less recognizable) options to post secondary education.

Technologies and Approaches

Technology will be necessary but not sufficient to drive radical change in higher education. Proliferation of technologies that connect teachers and learners must be accompanied by sound approaches to learning. For instance, infusing classes with game mechanics will encourage learners to explore and gain new skills. Massive

open online courses (MOOCs) and seminars allow one instructor (or teams of specialists) to reach out to tens or hundreds of thousands of learners while maintaining a level of intimacy found in classes of dozens. Ultimately, properly combining computer-mediated and face-to-face interactions will leverage the best of both approaches for the benefits of the learners.

Gamification

Applying game mechanics to non-game settings, gamification is a potentially disruptive approach to higher education. Not to be confused with educational games—in which typical classroom lessons are ported to a game format—gamification relies upon game mechanics that provide learners with exploratory space and encourage them to move through the space using feedback mechanisms (Raymer, 2011). This approach has been applied with success to marketing, the workplace, and now education. Successful games typically include three aspects: a goal that is to be met by the learner, obstacles that create challenge and difficulty for the learner, and collaboration or competition, which can included competition against self (Smith-Robbins, 2011).

Examples:

- An example in gamification exists in the economics school at Penn State. A professor designed his course in such a way that his grades are assigned a capital value, and can be "bought" by the students (Educause, 2011). Students can earn money by correctly answering multiple-choice questions throughout the course. Both of the course designs have been met with student enthusiasm, but there has been no independent validation completed to suggest that the gamified courses are any more effective than their non-gamified counterparts.

- At Pepperdine University, students in the business school are using a web-based game platform called Veri (Educause, 2011). The program is designed in such a way as to allow the professor to create tests online for the students to use. The tests provide game-like feedback for students and keep an online leader board.

- One large-scale implementation, albeit at the K-12 level, is Quest to Learn (Q2L) (A. M. Cohen, 2011). This public school replaces traditional curriculum and pedagogy with games designed to be highly engaging. All subjects are taught using game mechanics, requiring students to defeat "bad guys" as they learn. Students experience increased collective learning and participation, receive more timely feedback than in a standard class, and are supported in an environment where failing is acceptable (Renaud & Wagoner, 2011). Gamification is designed to simulate, in a fun way, situations and challenges experienced in everyday life while motivating students to succeed.

Gamification is not without its drawbacks and unanswered questions. Goals and progress must be clear to the learner (Smith-Robbins, 2011). Although games are designed to be fun, the novelty can quickly wear off when driven too heavily by external motivation, such as earning points and being assigned to a leader board for

exceptional performance (Danforth, 2011). Moreover, games are meant to be mysterious; they are wild and perhaps untamable. Churning out gamified classrooms in an algorithmic way might ultimately be counterproductive (Bogost, 2011).

Massively Open Online Courses (MOOCs)

Building on the works of constructivist learning theory, Massively Open Online Courses (MOOCs) dispense with the traditional curriculum-oriented educational approach in favor of an approach based on connecting specialized nodes of information (DeMillo, 2011). Guided by a facilitator, hundred or even thousands of students interact using social networking technologies such as wikis, blogs, and Twitter. MOOCs distance themselves from typical online distance courses by removing the passwords (Parry, 2010). Students are encouraged to freely share information with each other while developing emergent learning groups. The educational value of MOOCs is just now being explored.

Examples:

- One is a course entitled "Connectivism and Connective Knowledge" (CCK08) (Fini, 2009). The course was offered formally though the University of Manitoba, informally for free to anyone, anywhere in the world, and in a hybrid manner (e.g., for credit at another university). Although students were required only to develop a blog and concept maps, numerous other tools were brought to bear on the experience, from learning management software to 3D immersive environments. The experience catered to users' needs—such as those involving language, time, and ICT skills. Twenty-five "traditional" students quickly turned into 2,300 interconnected learners.

  A course developed by two leading experts of this approach has been implemented for free in an online setting. Sebastian Thrun, at the time a Stanford professor, and his Google colleague Peter Norvig took their course to a virtual setting. The class attracted 58,000 students from over 175 countries in its first iteration (Markoff, 2011). The population of this single class was more than four times the size of the Stanford student body. Thrun said he was inspired by the work of Salman Khan, founder of the Khan Academy, and created a vision to change the world by bringing education to where it currently does not reach. This class and underlying vision was instrumental in designing Udacity, the company created by Thrun. The immediate feedback of this course was very positive, detailing the experiences of non-traditional students and their desire for lifelong learning (Thrun & Evans, 2012). Monetary barriers make this a challenging model to sustain, but the opportunity to educate more students by breaking down the walls of the classroom is hard to ignore. The possibilities of free, online education are vast.

- Udactiy is a company dedicated to delivering free higher education courses to students of all ages, across the world. By offering courses that would generally be confined to leading institutions, Udacity hopes to create a model to further educate the world. Udacity boasts a system with positive reviews from both its educators and students (Thrun & Evans, 2012). The

intimacy and quality of the education was significantly improved over the lecture system, and this seems to legitimize the incorporation of online materials to supplement educational endeavors. The model, untested on a sustained basis, may not represent a replicable model for the future of education without the consideration of sustainability. Udacity has also experienced some pushback from traditional universities. While universities are willing to support the program, they have been uneasy about releasing certificates bearing university names (Henn, 2012).

- Change 11 centers around one very pivotal idea: being connected changes the way students learn and educators educate. Creating cross-culture collaborations can change the dissemination of knowledge, as well as the quality of the expertise. Change 11 is a MOOC that hosts thousands of participants from different countries. Theorizing that knowledge is inherently ingrained in networks, the facilitators of Change 11 are endeavoring to spread knowledge through its most natural form. This is where the MOOC makes a fundamental challenge to the current education system. Change 11 learning focuses not on structured information and memorization, but rather on the collaborative activities that the user participates in (Downes, Siemens, & Cormier, 2012). Change 11 claims that this structure will make the course different for each individual and more decentralized than a traditional course. The Change 11 MOOC breaks away from the Stanford A.I. course in its central design. Users were not taught by a leading expert, but rather guided through activities that took place on blogs, RSS feeds, web pages, etc. The decentralized learning experiment, which lasted for seven months, guided users through several online mediums as different researchers presented their findings each week.

It is not yet clear how best to implement an effective MOOC, but current evidence points to a delicate balance of a variety of factors. Openness offers the possibility for new voices to join the discussion, and while voices can dissent—sometimes for the benefit of those involved—these voices can sometimes be disruptive and unproductive (Parry, 2010). Proper facilitation of students resides somewhere between allowing the students to guide their own learning while at the same time creating an atmosphere of open communication (Kop, 2011). This open space for communication allows learners to build upon existing knowledge, but it can be difficult for some to get started given the potential extreme openness of the experience (Chamberlin & Parish, 2011).

Blended Learning

Aimed at leveraging the advantages of proximate and online modalities, blended learning combines face-to-face (FTF) interactions with communication enabled by information and communication technologies (ICTs). A key consideration here is that ICTs should be designed to complement—rather than replace—traditional pedagogy (López-Pérez, Pérez-López, & Rodríguez-Ariza, 2011). Further, each of the two components must be integrated to form an orchestrated learning approach (Schmidt et al., 2011). Initial research suggests that students are not only accepting blended learning approaches, but they are also improving learning outcomes. Blended learning approaches are currently being studied involving topics ranging from microscopic anatomy to foreign policy.

Examples:

- An introductory level chemistry course at Pennsylvania State University implemented a blended learning design through the adoption of a central course management system, ANGEL. The design of the course was such that many materials, including the textbook, were distributed online prior to the beginning of the first class. The students were able to access the online review materials, readings, and practice exams at any point upon registering for the class. The system incorporated an electronic guide to help students make their way through the materials. This format was combined with the traditional lecture style of the course during the semester. This method of course structure has proven successful in increasing student engagement and performance during the grading period (Amaral & Shank, 2010). The Penn State chemistry course found that for every student who passed the course in a non-blended learning lecture, 2.1 students passed in the blended learning experiment. Furthermore, the university observed that the hybrid courses produced a course GPA that was almost 0.3 points higher than the GPA of those in traditional courses.

- Using MyMiCROscope (Schmidt et al., 2011), students learned about anatomy using an intelligent virtual microscope, complete with continuously zoomable high resolution images and annotations. The tool had two primary impacts: it allowed students to work at a self-guided pace suited to their learning needs, and it encouraged group work and social interactions. When learning about foreign policy (Bliuc, Ellis, Goodyear, & Piggott, 2011), it was found that FTF interactions support lively and engaging discussions, while ICTs elicit reflective thoughts on the topic. Integration between these two elements is key.

Student acceptance is an important variable for determining the success of a blended learning experience. Without student engagement, the necessary discourse and interaction will not be achieved. For students to accept the approach, the system must be easy to use, enable to the teacher to respond in a timely manner, and—perhaps most importantly—be considered applicable and useful to the course itself (Tselios, Daskalakis, & Papadopoulou, 2011; G. Zhao & Yuan, 2010). Integration of ICTs with FTF is a necessary, but not easy, goal to achieve.

Massively Open Online Seminars

Considered by some as a contradiction in terms, Georgia Tech is exploring the potential of a MOOSe, or a Massive Open Online Seminar. Seminars are often conducted during advanced studies in graduate education, comprising a small number of students and a faculty member discussing complex topics. Seminars are an endeavor well suited to small groups, as they can result in lively discussions. The discussions are often on very specific topics, about which only a relatively small number of people know. There will be challenges to the MOOSe. How will instructors find enough people to make it massive? With it being open, how will participants know if they have sufficient knowledge of the advanced topics, both to share useful information and to understand what is being discussed? How can the online format be tailored to support these intense discussions? These and other

questions must be answered in order to make MOOSes practical and useful.

Disruptive Practices and Processes

The role of professors is changing from a classroom lecturer to a variety of other things, such as social network facilitator and information aggregator. Classrooms will be modeled after how people accomplish goals in the real world by situating learning in the real world. Disappearing are the days of broadcast teaching where a lecturer professes one-size fits all knowledge to a group of passive recipients (DeMillo, 2011). Developing are new ways of certifying skills and new markets to find learning opportunities. Learners are now able to tailor their experience based on their interests and experiences, not to mention their budget.

Social Learning

Social networks offer the possibility of changing how learning is consumed. The many nodes of a learning network—such as the professor, the students, and domain experts—can be connected equally and without hierarchy. Further, the innovative deployment of ICTs (e-accessibility) can open entirely new possibilities for students with disabilities, giving new dimensions to the concept of college access. Knowledge can flow freely among peers and between learners and teachers. By bringing together learners, teachers, and professionals, students can engage in pragmatic problems, learning in the context that the knowledge will be used.

Examples:

- Second Life is the most developed and most popular form of a multi-user virtual platform. Second Life has millions of users worldwide, and it has been this success that has driven educators to question the possibility of its usefulness in the classroom. Educators, in order to foster collaborative work between students in a virtual environment, are implementing the technology as a supplemental learning tool. This technology is not without inherent barriers to use, though. The complexity, intricacy, and to some degree, accessibility, of the Second Life experience (Forman, et. al. 2011), makes it difficult to implement effectively in semester-long classes. According to a survey of students (Warburton, 2009), the technical aspect of managing Second Life is very sophisticated and requires dedicated hours of up-keep. Warburton found that students would struggle with the technical aspect of the game, thus reducing their enjoyment and benefit from its use. Without the appropriate amount of time to educate users, Second Life can become a major detraction for students. However, as the accessibility and user-friendliness continues to improve, Second Life is poised to become an excellent tool for the simulation of real problems in a virtual setting.

- Social Media Classroom is designed to be a one-stop shop for educational resources. It compiles pedagogical practices and related resources for educators to use in their own classrooms. It is completely free and is designed to be a virtual community of practice for those in the education field. The inherent barriers to the successfulness of this technology lie in anonymity and the lack of quality control. The compiled practices are not guaranteed to be the best, and the user posting the practices is not guaranteed to be who they say they are. This approach is a significant step in the right direction for those in the teaching world, but it remains

somewhat unregulated. There is opportunity to approve user feedback and accountability within the site to improve the information being used. The value of a compendium on best pedagogical practices would be immeasurable, and those involved in higher education should strive to see this technology flourish.

Enhancing connect among learners in a mediated virtual environment has the potential to create emergent groups focused on exploring topics of interest to the group. The groups can form and evolve based on the needs and wishes of the members (Baker and Ward, 2002). But how will these groups stay on task? Learning requires effort, and will learners put forth the effort with little to no input from a facilitator? These questions remain to be answered, perhaps simply through trial and error.

Alternative Certification

A new model that rethinks the idea of accomplishment and necessitates continuous improvement will replace the traditional model of granting degrees. Current degrees represent an end-point, a notion that a predefined curriculum has been mastered and that learning has been achieved. In this new model, there will be no end-point, no time at which learning has been completed. Continuous learning will become the norm as employers look for people who are able to keep up with—and even push forward—ever-changing technologies.

One potential mechanism for supporting this new view of certification is *badges*. Or put another way, the Boy Scouts model of mastery meets higher education. For various skills—technical writing, web programming, graphic communications—students and employees alike will be able to take short, mini-courses to gain new skills. These skills can be acquired on the fly, only when necessary. Skill specialization can occur, allowing workers to become more productive while avoiding lengthy absenteeism to attend marginally relevant classes.

Examples:

- Mozilla, developer of the popular web browser Firefox, is offering an open badge program[1] aimed at providing recognition for life-long learning experiences. The goal is to allow anyone to display earned badges and for others to know what those badges mean. As seen by the Open Badges project, there are six uses for badges:
  1. Capturing the learning path,
  2. Signaling achievement,
  3. Providing motivation,
  4. Supporting innovation and flexibility,
  5. Building identity and reputation, and
  6. Building community and kinship.
  The group issued a working paper describing the possibilities for defining, assessing, collecting, and sharing badges.

- At the Digital Media and Learning Conference in 2012, with backing from

---

[1] http://openbadges.org

the John T. and Catherine D. MacArthur Foundation, winners were announced for the Badges for Lifelong Learning Competition[2]. The prizes are offered to support continued development on these efforts. Included among the winners were:

- Carnegie Mellon University's Computer Science Student Network, aimed at teaching computer science online;
- Design for America, focused on design for social good; and
- A partnership between Moodle and Mahara, allowing badges to be displayed in Moodle's grade books.

Badges, while holding the promise to deliver skills in a timely and targeted manner, fly in the face of traditional certification and accreditation. How will this approach be standardized—if it should be standardized at all—so that the badges convey something meaningful? A sea of buzzword-entitled badges might only serve to confuse employers as to the actual skills possessed by students. As courseware is opening up, perhaps certification should follow. We should allow those who receive benefit from certification—in this case, employers who wish to know what skills will be possessed by a new graduate who has received any sort of certification—to define how to certify badges. Or perhaps third parties will develop to independently and objectively review these new forms of certifications, endorsing those that meet a certain set of criteria. But these criteria will need to be validated. We will need to determine if gaining a badge results in improved work-place performance.

"Markets" for Learning Options

Learners in increasing numbers are realizing they have the option to shop around for the educational experience that best suits their needs, constraints, and resources. There are a range of options—both old and new—that allows learners to acquire knowledge and skills. Online courses are being offered for free or little charge. Traditional schools are putting some of their content online for free. Complete online degrees are being offered for prices much lower than the tuition and fees students have been paying for a long time to attend traditional colleges and universities. While the efficacy of these options is currently being explored, they offer enticing approaches to traditional learning models.

Examples:

- MITx is endeavoring to take a course from one of the world's top engineering institutions and offer it for free in an online setting. Although still in its infancy, MITx is creating waves in the world of higher education because it is the first institution to offer courses under its own brand name and offer certification for passing the course. This technology is still governed by MIT and thus has many political and monetary barriers. Professors have voiced their concern that the success of the program could leave the future of residential universities in question (Kolowich, 2012). They have raised questions regarding the need for apprenticeship instruction if students are able to master the material in online settings. If this model were to become a common aspect of universities, it has the potential to completely change the landscape of how classes are taught in

[2] http://chronicle.com/blogs/wiredcampus/badge-based-learning-competition-names-winners/35638

the post-secondary education world.

- A subsequent MIT initiative established a partnership with Harvard known as edX. Both universities allocated $30 million to develop the combined project and co-govern the courses. With lead developer of MITx Anant Agarwal serving as president, edX views its platform as an opportunity to provide researchers with data sets that could prove to be "very statistically significant in a very short amount of time" (DeSantis, 2012). The universities insist that the venture is an exploration of the efficacy of online learning in higher education and an equally important endeavor to identify strategies to make the platform self-sustaining. University students and life-long learners alike receive an experience akin to that of attending classes at the prestigious universities, but they don't receive university credit for completing the course. The two universities hope that their partnership will encourage cross-institution collaboration among other universities, as well as a ready-made avenue for significant research on the stability and practicality of Internet-based university classes.

- Much in line with the vision of Udacity, Coursera is a collaboration of professors from top universities who offer their courses for free in an effort to revitalize education. The vision of the program is to significantly expand the impact of the world's best universities. The courses allow students to learn at their own pace and enjoy flexible hours, while receiving the highest quality education. Coursera is poised to have a different impact than a company like Udacity because it is so tightly engrained within premier universities. By allowing professors to post their courses online, universities are facilitating the education of far more students than ever before. The technology is a limiting factor of online learning endeavors, however, partially because the online medium limits the societal composition of the students.

- The Khan Academy is a compendium of online resources originally designed for high school students. The academy focuses on the development of a variety of skills over time, using videos to instruct student on essential concepts. All of the material is provided freely to students wanting to learn, or practice, as supplemental material to their traditional education. Founder Salman Khan states that he is taking the "Silicon Valley" approach to education and providing open access to everyone. The Khan Academy is not a structured course program like Udacity; rather it focuses on providing resources for students. Educators have expressed their belief in the potential of the system but question the motivation of students to truly take advantage of the resource. Khan does not consider his academy to be an alternative to a university, but he insists that higher education must move in a different direction. Furthermore, he questions why universities charge high tuition for students to sit in 300-person lectures when online courses, which allow students to move through the material at their own pace, can be offered for free.

- YouTube Edu focuses on the dispersal of short educational videos for

students of all calibers and ages. YouTube EDU takes videos from teachers, professors, practitioners, and even global leaders in an effort to supplement the education of today's students. YouTube EDU does not offer the same level of educational supplements that other online practitioners provide, but it has more available content. YouTube EDU is not viewed as a complete educational tool because it lacks the companion materials like quizzes and assignments offered by other sites. However, YouTube EDU presents one of the largest potentials because of its dual purpose. Its sustainability, universal access, and established identity make it an ideal candidate for offering free, multimedia-learning videos. Currently, videos on YouTube EDU experience success as one-time videos, but there is very little structure in terms of guided learning courses. YouTube EDU stands as a great tool for students wishing to pull in outside information, or listen to a new lecture, but it does not stand alone as a course supplement.

- TED-Ed began in 1984 as a conference designed to bring together practitioners in the fields of Technology, Entertainment, and Design. What began as a conference has evolved into a brand identity. TED-Ed has become a platform for some of the world's most brilliant thinkers. TED-Ed is a collection of videos created by some of the brightest and most intellectual educators from around the world. Designed as a supplement for interested learners, TED Ed offers an opportunity for students to learn from top educators. Although the videos are thought invoking, they are not designed to serve as a parallel to a full class in a particular subject. TED-Ed has promise for students who desire to learn more about a wide variety of subjects, but its lack of depth stands as a barrier. Without the necessary depth of instruction, TED-Ed is not a comparable alternative to other online course options. The videos and talks are very high quality, but there is no course material, embedded quizzes, or follow-up lessons, making TED-Ed more of a seminar than a course.

Although these new markets, platforms, and venues offer many possibilities to learners, will they survive and will they work? Freely providing knowledge that some institutions charge more for than the price of a new automobile *on an annual basis* is surely disruptive, but it presents a challenge for developing a sustainable business model. Many of these institutions also have prestige supporting their credentials. Sebastian Thrun, for example, left Stanford University to give away the same knowledge that the university was charging for, but will others recognize this quality without the revered Stanford name behind it? Ultimately, these efforts offer knowledge to the world, but can the quality of instruction keep pace with the expansion of distribution provided by the Internet?

New Metrics of Assessment   Evaluating the quality and value of higher education programs is becoming more critical for public and private institutions alike. Stakeholders are demanding to know what these programs provide students and ultimately how these benefits improve society (Grayson, 2012). Driving the economy is one of the primary goals of higher education, from community colleges to research universities, but growth cannot occur if we can not link economic outcomes to student success. Instead of ensuring that more students get degrees, we should be determining what jobs are needed

and what degrees are required (Sparks & Waits, 2011). We need new ways of measuring student success within the classroom and ultimately how that success translates into benefits for both the student and society after the degree has been granted. Formative and summative assessments are useful at the classroom level, but developmental assessments are necessary at the program level. These assessments must focus less on *how* the program works and more on *why* the program operates (Grayson, 2012). Here, we consider disruptive ideas at two levels—the classroom and the intuition—where the way in which we think about assessment is changing.

Classroom "Clickers"

The reign of the broadcast model of teaching—large lecture halls with students as passive receptacles of spouted wisdom—is waning and being replaced with new models that allow for real-time interconnectivity. Personal response systems (also known as audience response systems, classroom response systems, electronic voting systems, or simply "clickers") are allowing lecturers to quickly probe the knowledge of dozens or hundreds of students with the intent of online modifications to instruction. The general premise is this: students come to class equipped with wirelessly connected devices, lecturers pose questions (typically multiple choice format) to the entire class, students respond, the anonymized and aggregated results are shown to everyone. From here, the lecturer decides how to proceed, often addressing common wrong answers and providing any necessary instruction to clarify any misconceptions. In some cases, students will demonstrate that many of them have completely understood the concepts, and the lecturer can then move forward knowing how many students are digesting the material.

Examples:

- Clickers have been around for over a decade but only recently have gained acceptance. This increase in acceptance is likely due to the refinement of the technology and reductions in operational cost. They are typically used most effectively in large lecture halls but similar benefits—and fewer technical glitches—were seen in a small, 15-person statistics class. In a pilot at Kutztown University, however, class size was *negatively* correlated with satisfaction, likely due to technical issues and the instructors' unfamiliarity with the technology. Those who used them in science classes were more satisfied, likely because the instructors had been using them for a longer time. (Jefferson & Spiegel, 2009).

- Using clickers in the classroom seems to be generally correlated with increases in student achievement. Interestingly, increased clicker usage and perceiving that there is a benefit to using them is correlated with better grades. In a psychology course, for example, non-majors and seniors reported fewer perceived benefits and uses than majors (Dallaire, 2011) . Clickers provide a number of benefits: they are useful for students of all ages, there is only a slight learning curve to implement them, and they have been shown to be generally effective in science instruction (Moss & Crowley, 2011). In nursing education, there are also demonstrated benefits of using clickers. They support active learning, attention, conducive environments, and encourage preparation on the part of the students

(FitzPatrick, Finn, & Campisi, 2011).

One of the greatest challenges of using clickers in the classroom is the development of questions. Ideally, lecturers should create branching questions, but these are difficult to implement in real-time (Titman & Lancaster, 2011). There are also mediating factors that influence student outcomes, and they tend to vary by discipline. Clickers helped students learn more in anatomy and physiology, but not in pathophysiology, which indicates that more research is needed (FitzPatrick et al., 2011). Developing a better understanding of the variables that influence student improvement will lead to better-designed clicker programs. While there are concerns, such as technological glitches and the workload to prepare questions, clickers can play an important role in formative assessment and adaptive teaching techniques (De Gagne, 2011). Much more can be done with them, and we are limited only by the creativity of those who implement them (Moss & Crowley, 2011).

Ranking Indices and Individuals

There are many metrics for comparing institutions, which are used by thousands of prospective students each year. Among them are those prepared by and published in *The Princeton Review*, *Forbes*, and *Times Higher Ed*. Although these tools are designed to help students find the right school for them, some have drawn criticism. In 2007, 28 colleges boycotted the *U.S. News and World Report* ranking system by refusing to fill out their surveys, citing false precision and non-warranted authority based on the data used in the metric (Butler, 2007). There may also be hidden financial motives tied to the rankings as well. While many people external to the university system rely upon them as selection tools, ranking systems have an entirely different meaning to the universities themselves, especially in terms of financial impact. For example, public universities can charge more to out-of-state students because of the perceived value of attending a more prestigious university (Bastedo & Bowman, 2011). Also, admissions tend to increase as school moves into the top quartile of the *U.S. New and World Report* ranking, a position that happens to be on the first page of the online and printed publication. Studies have shown that as a university's rank increased, the amount of Pell grants awarded to students attending that university decreased. Private universities have more flexibility to adjust net tuition in response to changes (Meredith, 2004).

Some are calling for new metrics that focus on how well institutions of higher education help students move through the system—such as success in first-year courses, course completion rates, and success beyond remedial education. Perhaps more importantly, new measurements should include outcome metrics—such as time and credits to degree completion and number of degrees and certificates awarded (Reyna, 2010). Some say we need a comprehensive system for ensuring success in higher education, particularly for those institutions that receive federal aid (Toch, 2010). But before we consider a panacea to the ranking issues, we should first consider what defines higher education value. Despite being aimed at all potential students, college rankings rarely take into account culturally-relevant factors, such as individualistic versus collectivistic self-construal (Cremonini, Westerheijden, & Enders, 2008). Furthermore, not all students share the same goal. What is valuable for one student might be irrelevant for another.

Examples:

- Originated in Germany and expanded to cover all of Europe, U-Multirank is designed to overcome one of the major flaws of the leading indexes: an overreliance on research output. But more interestingly, this tool also allows interested parties to select indicators that are important to them (Butler, 2010). Self-defined as a "a multi-dimensional global university ranking," U-Multirank proclaims this goal:

    U-Multirank is a new international transparency tool, which is multi-dimensional, multi-level and user-driven. Because of these characteristics it differs substantially from all existing higher education rankings and addresses the needs of various stakeholders in higher education.[3]

- Another effort to bring validity to the college ranking system is being developed by a partnership between Thompson Reuters and Times Higher Ed. Known as the Global Institutions Profile Project, it is built on the basic principles that "one size does not fit all — as the world continues to flatten and specialize, profile databases must broaden in scope, deepen in content, and become increasingly flexible." The project promises to bring transparency and individualization to the game:

    The Profiles Project will create data-driven portraits of globally significant institutions, combining reputational assessment, scholarly outputs, funding levels, faculty characteristics and much more in one comprehensive database. Thomson Reuters also brings a celebrated legacy of data transparency to the Profiles Project, operating with clear methodology and data gathering practices. The added input variables, more transparent methodology, and many additional project elements will provide the nuances to explain a wide range of ranking initiatives, revealing what diversity lies within.[4]

But these efforts might not go far enough. The learners of today are a diverse set of people with a unique set of needs. Traditionally, researchers have used the age of 24 as the cutoff for traditional and non-traditional students, but this is no longer sufficient (Macari & Andrea, 2006). Students exhibit numerous characteristics, and bring with them a variety of experiences, that colleges and universities must consider to stay competitive and to provide value. These characteristics include: "the amount of time between their high school graduation and enrollment in college, the nature of their high school credentials (diploma, GED, etc.), the number of credits they were currently enrolled in, weekly hours spent at paid employment, whether they were financially dependent or independent, if they had dependents other than a spouse, and whether they were single parents" (Macari & Andrea, 2006). College ranking indices need to take into account these and other variables and fully understand how they relate to student outcomes and societal impacts.

Institutional Innovation and   Opening up access to content begs answers to some important questions to ensure

---

[3] http://www.u-multirank.eu/

[4] http://ip-science.thomsonreuters.com/globalprofilesproject/

that the process is equitable. Socioeconomic status has long been a barrier to higher education, but even with new technological mechanisms for sharing knowledge, how and who should pay? No matter where learning occurs, devices such as tablets and smart phones are key, so what accommodations will be made for those without the necessary technology? Cross-cultural collaborations are becoming increasingly easier, but how do various parties interact given language barriers? Those with disabilities and functional limitations can potentially benefit from the proliferation of educational technologies, but how do we design them to support access for all learners? These are just a few of the many questions facing all stakeholders—students, parents, faculty, administrators, policymakers, and more—to truly re-envision intuitions of higher education in the 21st century.

Having evolved over decades and centuries, many institutions have kept up with an ever-changing world. But considering the rapidly changing landscape that comprises the skill-base of workers and professionals today, these institutions must change just as quickly—if not more quickly—than the needs of the populations they serve. Physical campuses are going to change. We are likely to see campuses merge to eliminate redundancies and improve efficiency. There may be an effort to focus and refine the notion of campus. Yet there are other approaches that seek to redefine the *concept* of campus. One such approach is MITx, the program being offered by the Massachusetts Institute of Technology, which offers free content online. No longer is the acquisition of knowledge from MIT limited to the confines of a campus.

In some cases, however, reinventing the institutional experience of colleges and universities has required starting from square one, at least in terms of the physical aspect of the experience. Courses from giants such as the Massachusetts Institute of Technology and the University of Michigan are being used as the intellectual basis for new, online colleges. Many, charging a nominal fee compared to typical tuition costs, are offering courses to thousands of students, with enrollments growing each year. Knowledge from these distinguished campuses is now reaching students hundreds or thousands of miles away, students who might never step foot on the physical university campus.

Radical change in higher education will come from partnerships composed of a wide array of actors: faculty, instructors, NGOs and foundations, researchers and governments—ones who are exploring new ways to engage students, both within and beyond the walls of the classroom. Digital technologies and virtual learning platforms make new interactions possible between teacher and student, between student and material (e-accessibility), as well as among students themselves. These technological innovations, coupled with a willingness to rethink the construct and delivery of higher education, shift away from the idea of the provision of services to the customization of learning opportunities at a lower cost. These innovations also suggest that radically new ideas of education, akin to the deployment of mass production (the Model T or of the iTunes ecosystem), are upon the horizon. In any case, at the end of the day, any signification innovation and change in higher education must come from within the institutions themselves if they are to remain relevant. Absent that, they will go the way of many institutions that failed to adapt to changing environments.

References

Amaral, K., & Shank, J. (2010). Enhancing Student Learning and Retention with Blended Learning Class Guides. *Educause Quarterly*, *33*(4).

Amthor, R. F., & Metzger, S. A. (2011). The Expanding Polity: Theorizing the Links between Expanded Higher Education and the New Politics of the Post-1970s. *Globalizations*, *8*(1), 65-80.

Bacchetti, R., & Ehrlich, T. (2006). Reconnecting Colleges and Foundations. *The Chronicle of Higher Education*, *53*(13), B.20.

Baker, P. M.A., and Ward, A.C. (2002). "Bridging Temporal and Spatial "Gaps": The Role of Information and Communication Technologies in Defining Communities." *Information Communication and Society.*   Vol. 5 (2) 207-224.

Bastedo, M., & Bowman, N. (2011). College Rankings as an Interorganizational Dependency: Establishing the Foundation for Strategic and Institutional Accounts. *Research in Higher Education*, *52*(1), 3-23. doi:10.1007/s11162-010-9185-0

Bernasconi, A. (2006). Does the Affiliation of Universities to External Organizations Foster Diversity in Private Higher Education? Chile in Comparative Perspective. *Higher Education*, *52*(2), 303-342.

Bernstein, A. R. (2003). Is Philanthropy Abandoning Higher Education? *The Presidency*, *6*(3), 34-37.

Blewitt, J., & Cullingford, C. (2004). *The Sustainability Curriculum: The Challenge for Higher Education*. London, UK: Earthscan.

Bliuc, A.-M., Ellis, R. A., Goodyear, P., & Piggott, L. (2011). A blended learning Approach to teaching foreign policy: Student experiences of learning through face-to-face and online discussion and their relationship to academic performance. *Computers & Education*, *56*(3), 856-864.

Bogost, I. (2011, August 8). Gamification is Bullshit [Web log message]. Retrieved June 14, 2012, from http://www.bogost.com/blog/gamification_is_bullshit.shtml

Bollag, B. (2000). 4 foundations start $100-million effort to help universities in Africa. *The Chronicle of Higher Education*, *46*(35), A56.

Bollag, B. (2007). Financing for Higher Education Shifts to Private Sector Worldwide. *The Chronicle of Higher Education*, *53*(50), A.36.

Borrego, A. M. (2001). A Wave of Consolidation Hits For-Profit Higher Education. *The Chronicle of Higher Education*, *47*(48), A.42-A43.

Butler, D. (2007). Academics strike back at spurious rankings. *Nature*, *447*(7144), 514-515. doi:10.1038/447514b

Butler, D. (2010). University rankings smarten up. *Nature*, *464*(7285), 16-17.

Chamberlin, L., & Parish, T. (2011). MOOCs: Massive Open Online Courses or Massive and Often Obtuse Courses? *eLearn*, *2011*(8). doi:10.1145/2016016.2016017

Cohen, A. M. (2011). The Gamification of Education. *Futurist*, *45*(5), 16-17.

Courant, P.N., McPherson, M., & Resch, A. M. (2006). The Public Role in Higher Education. *National Tax Journal*, *59*(2), 291-318.

Cremonini, L., Westerheijden, D., & Enders, J. (2008). Disseminating the right information to the right audience: cultural determinants in the use (and misuse) of rankings. *Higher Education*, *55*(3), 373-385. doi:10.1007/s10734-007-9062-8

Dallaire, D. H. (2011). Effective Use of Personal Response "Clicker" Systems in Psychology Courses. *Teaching of Psychology*, *38*(3), 199-204.

Danforth, L. (2011). Gamification and Libraries. *Library Journal*, *136*(3), 84.

De Boer, H. F., Enders, J., & Leisyte, L. (2007). Public sector reform in dutch higher education: The organizational transformation of the university. *Public Administration*, *85*(1), 27-46.

De Cohen, C. C. (2003). Diversification in Argentine higher education: Dimensions and impact of private sector growth. *Higher Education*, *46*(1), 1-35. doi:10.1023/A:1024448212746

De Gagne, J. C. (2011). The impact of clickers in nursing education: A review of literature. *Nurse Education Today*, *31*(8), e34-e40.

DeMillo, R. A. (2011). *Abelard to Apple: The fate of American colleges and universities* (p. 344). Cambridge, MA, USA: MIT Press.

DeSantis, N. (2012, May 2). Harvard and MIT Put $60-Million Into New Platform for Free Online Courses [Web log message]. Retrieved June 14, 2012, from http://chronicle.com/blogs/wiredcampus/harvard-and-mit-put-60-million-into-new-platform-for-free-online-courses/36284

Dervarics, C. (2012). Advocates Say 2012 Critical Year for Action on Private Student Loans. *Diverse: Issues in Higher Education*, *28*(26), 6-7.

Dew, J. (2010). Global, Mobile, Virtual, and Social: The College Campus of Tomorrow. *Futurist*, *44*(2), 46-50.

Dodds, A. (2009). Liberalization and the public sector: The pre-eminent role of governments in the "sale" of higher education abroad. *Public Administration*, *87*(2), 397-411.

Downes, S., Siemens, G., & Cormier, D. (2012). Instructional Technology. Retrieved June 14, 2012, from http://change.mooc.ca

Educause. (2011). *7 Things You Should Know About ... Gamification* (p. 2). Washington, DC, USA: Educause Learning Initiative.

Efird, R. (2010). NGOs and Institutions of Higher Education in China's Environmental Learning. *Chinese Education & Society*, *43*(2), 3-5.

Eisemon, T. O. (1992). Private Initiatives in Higher Education in Kenya. *Higher Education*, *24*(2), 157-175.

Fehnel, R. (2006). Private higher education. In N. Cloete, P. Maassen, R. Fehnel, T. Moja, T. Gibbon, & H. Perold (Eds.), *Transformation in higher education: Global pressures and local realities* (p. 322). New York, NY, USA: Taylor & Francis.

Fini, A. (2009). The Technological Dimension of a Massive Open Online Course: The Case of the CCK08 Course Tools. *International Review of Research in Open and Distance Learning*, *10*(5), 1 - 26.

FitzPatrick, K. A., Finn, K. E., & Campisi, J. (2011). Effect of personal response systems on student perception and academic performance in courses in a health sciences curriculum. *Advances in Physiology Education*, *35*(3), 280-289.

Fleishman, J. L. (2007). Reconnecting Education and Foundations: Turning Good Intentions into Educational Capital. *Review of Higher Education*, *31*(1), 114-115.

Forman, A.E., Baker, P.M.A., Pater, J. and Smith, K. (2011) "Beautiful to me: Identity, disability, and gender in virtual environments." International Journal of E-Politics, V.2 (2) 1-17.

Goldin, C., & Katz, L. F. (1998). The origins of state-level differences in the public provision of higher education: 1890-1940. *The American Economic Review*, *88*(2), 303-308.

Grayson, T. E. (2012). Program Evaluation in Higher Education. In C. Secolsky & D. B. Denison (Eds.), *Handbook on Measurement, Assessment, and Evaluation in Higher Education*. New York, NY, USA: Routledge, Taylor & Francis Group.

Henn, S. (2012, January 23). Stanford Takes Online Schooling to the Next Academic Level. Retrieved June 14, 2012, from http://www.npr.org/blogs/alltechconsidered/2012/01/23/145645472/stanford-takes-online-schooling-to-the-next-academic-level

Jefferson, W., & Spiegel, D. (2009). Implementation of a University Standard for Personal Response Systems. *AACE Journal*, *17*(1), 1-9.

Kamens, D. (2009). The Expanding Polity: Theorizing the Links between Expanded Higher Education and the New Politics of the Post-1970s. *American journal of education*, *116*(1), 99 - 124.

Kolowich, S. (2012, April 6). The MITx Factor. *Inside Higher Ed*. Retrieved June 14, 2012, from http://www.insidehighered.com/news/2012/04/06/how-could-mitx-change-mit

Kop, R. (2011). The Challenges to Connectivist Learning on Open Online Networks : Learning Experiences during a Massive Open Online Course. *International Review of Research in Open and Distance Learning*, *12*(3), 19-38.

Kuenzi, M. (2006). Nonformal Education, Political Participation, and Democracy: Findings from Senegal. *Political Behavior*, *28*(1), 1-31. Springer Netherlands. doi:10.1007/s11109-005-9000-3

López-Pérez, M. V., Pérez-López, M. C., & Rodríguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. *Computers & Education*, *56*(3), 818-826.

Maassen, P., & Stensaker, B. (2011). The knowledge triangle, European higher education policy logics and policy implications. *Higher Education*, *61*(6), 757-769.

Macari, D. P., & Andrea, L. D. (2006). A comparative study of psychosocial development in nontraditional and traditional college students. *Journal of College Student Retention: Research, Theory and Practice*, *7*(3-4), 283-302.

Marcy, M. B. (2003). Why Foundations Have Cut Back in Higher Education. *The Chronicle of Higher Education*, *49*(46), B.16-B.16.

Marginson, S. (2007). The public/private divide in higher education: A global revision. *Higher Education*, *53*(3), 307-333.

Markoff, J. (2011, August 15). Virtual and Artificial, but 58,000 Want Course. *The New York Times*. Retrieved April 26, 2012, from http://www.nytimes.com/2011/08/16/science/16stanford.html?_r=1

Meredith, M. (2004). Why Do Universities Compete in the Ratings Game? An Empirical Analysis of the Effects of the U.S. News and World Report College Rankings. *Research in Higher Education*, *45*(5), 443-461.

Moss, K., & Crowley, M. (2011). Effective learning in science: The use of personal response systems with a wide range of audiences. *Computers & Education*, *56*(1), 36-43.

Nelsen, W. C. (2004). How the Private Sector Can Help More Students. *The Chronicle of Higher Education*, *50*(34), B.19-B20.

Parry, M. (2010). Online, Bigger Classes May Be Better Classes. *Chronicle of Higher Education*, *57*(2), A1-A22.

Payton, R. L. (1990). Foundations and Higher Education: Reflections and Expectations. *The Educational Record*, *71*(4), 28.

Pillay, T. (2010). Critical Perspectives on NGOs and Educational Policy Development in Ethiopia. *Journal of Alternative Perspectives in the Social Sciences*, *2*, 90-119.

Raymer, R. (2011). Gamification: Using Game Mechanics to Enhance eLearning. *eLearn*, *2011*(9). New York, NY, USA: ACM. doi:http://doi.acm.org/10.1145/2025356.2031772

Renaud, C., & Wagoner, B. (2011). The Gamification of Learning. *Principal Leadership*, *12*(1), 57-59.

Reyna, R. (2010). *Complete to compete: Common college completion metrics* (p. 18). Washington, DC, USA: National Governors Association Chair's Initiative.

Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York, NY, USA: Free Press.

Salerno, C. (2004). Public Money and Private Providers: Funding Channels and National Patterns in Four Countries. *Higher Education*, *48*(1), 101-130. Springer Netherlands. doi:10.1023/B:HIGH.0000033767.84394.47

Schafer, M. J. (1999). International nongovernmental organizations and third world education in 1990: A cross-national study. *Sociology of Education*, *72*(2), 69-88.

Schmidt, C., Reinehr, M., Leucht, O., Behrendt, N., Geiler, S., & Britsch, S. (2011). MyMiCROscope—Intelligent virtual microscopy in a blended learning model at Ulm University. *Computers & Education*, *193*(5), 395-402.

Schneider, A. (1999). Bill Gates merges 2 foundations to form $17-billion philanthropy. *The Chronicle of Higher Education*, *46*(2), A76-A76.

Smith-Robbins, S. (2011). "This Game Sucks": How to Improve the Gamification of Education. *EDUCAUSE review*, *46*(1), 58-59.

Sparks, E., & Waits, M. J. (2011). *Degrees for what jobs? Raising expectations for universities and colleges in a global economy* (p. 48). Washington, DC, USA: National Governers Association: Center for Best Practices.

Tarí, J. J. (2008). Self-assessment exercises: A comparison between a private sector organisation and higher education institutions. *International Journal of Production Economics*, *114*(1), 105-118.

Teferra, D. (2006). Higher Education in Sub-Saharan Africa. In J. J. F. Forest & P. G. Altbach (Eds.), *International Handbook of Higher Education* (pp. 557-569). Springer Netherlands. doi:10.1007/978-1-4020-4012-2_28

Teferra, D., & Altbachl, P. G. (2004). African higher education: Challenges for the 21st century. *Higher Education*, *47*(1), 21-50. Springer Netherlands. doi:10.1023/B:HIGH.0000009822.49980.30

Teichler, U. (1999). Higher education policy and the world of work: changing conditions and challenges*. *Higher Education Policy*, *12*(4), 285-312.

Teixeira, P. N. (2008). Rethinking private higher education: The Portuguese experience. *International Educator*, *1*, 7-11. Washington, Washington: NAFSA : ASSOCIATION OF INTERNATIONAL EDUCATORS.

Thrun, S., & Evans, D. (2012). Reinventing the University. *C21U Town Hall*. Atlanta, GA, US: Center for 21st Century Universities.

Tilak, J. B. G. (2008). Higher education: a public good or a commodity for trade? *Prospects*, *38*(4), 449-466. Paris, Netherlands, Paris: Springer Science & Business Media. doi:10.1007/s11125-009-9093-2

Titman, A. C., & Lancaster, G. A. (2011). Personal Response Systems For Teaching Postgraduate Statistics To Small Groups. *Journal of Statistics Education*, *19*(2).

Toch, T. (2010). Link Higher Education and Results. *Phi Delta Kappan*, *91*(6), 70-71.

Tolymbek, A. (2005). Public Policies in the Higher Education of Kazakhstan. In M. Gervers, U. Bulag, & G. Long (Eds.), *History and Society in Central and Inner Asia* (pp. 277-291). Toronto: Asian Institute, University of Toronto.

Tselios, N., Daskalakis, S., & Papadopoulou, M. (2011). Assessing the Acceptance of a Blended Learning University Course. *Educational Technology & Society*, *14*(2), 224-235.

Van der Werf, M. (2001). 2 Foundations Initiate Liberal-Arts Project. *The Chronicle of Higher Education*, *48*(3), A.33-A33.

Warburton, S. (2009). Second Life in higher education: Assessing the potential for and the barriers to deploying virtual worlds in learning and teaching. *British Journal of Educational Technology*, *40*(3), 414-426. doi:10.1111/j.1467-8535.2009.00952.x

Welch, A. (2007). Blurred Vision?: Public and Private Higher Education in Indonesia. *Higher Education*, *54*(5), 665-687. Springer Netherlands. doi:10.1007/s10734-006-9017-5

Whitchurch, C. (2010). Some implications of "public/private" space for professional identities in higher education. *Higher Education*, *60*(6), 627-640. doi:10.1007/s10734-010-9320-z

Whitworth, A. (2012). Invisible success: Problems with the grand technological innovation in higher education. *Computers & Education*, *59*(1), 145-155.

Wilhelm, I. (2011). Big Foundations' Africa Partnership Offers Lessons for Universities in U.S. *The Chronicle of Higher Education*, *57*(35), n/a.

Wilkinson, R., & Yussof, I. (2005). Public and Private Provision of Higher Education in Malaysia: A Comparative Analysis. *Higher Education*, *50*(3), 361-386. doi:10.1007/s10734-004-6354-0

Winbush, D. (1996). Taking Stock And Refocusing: Foundations Forcing Shifts in Educational Priorities. *Diverse Issues in Higher Education*, *13*(13), 34.

Xiao, F. (2001). Nongovernmental colleges develop despite difficulties. *Beijing Review*, *44*(32), 18-19.

Zhao, G., & Yuan, S. (2010). Key Factors of Effecting Blended Learning Satisfaction: A Study on Peking University Students. *Lecture Notes in Computer Science*, *6248*, 282-295.

Zhao, X. (2010). Market Forces in Higher Education-Chinese and British Experience between Mid-1980s and Mid-1990s. *International Education Studies*, *3*(1), 66-72.

Zuboff, S. (2010). *Creating value in the age of distributed capitalism*. New York, NY, USA: McKinsey & Company.