Twenty-First Century Universities as Drivers for Innovation

Paul M.A. Baker, Shiri M. Breznitz, Art Seavey, Keith R. Bujak
Published online on: 08 Oct 2015
Nodes of innovation in a global economy

Universities have historically been seen as bastions of stability and anchors of traditions (DeMillo 2011). In the twenty-first century, universities are increasingly expanding their traditional roles of teaching and research to include technology transfer, economic initiatives, and workforce development, partially in response to technological and global economic factors. They have become drivers of innovation both physically, in their immediate locales, as well as virtually, in terms of dissemination of knowledge. In many places, the university’s strengths of teaching and pure research represent untapped opportunities to collaborate with other actors across institutional boundaries, leveraging sector strengths (Cross 2013). Public perception of what the university of the twenty-first century can do has not always kept up with these changes, and is a potential barrier to industry–university partnerships (Baker et al. 2012). The influence of universities beyond their immediate physical environs is not a new idea in the geographic literature (e.g., Audretsch et al. 2005; Mueller 2006), but is magnified by the adoption of information and communications technologies (ICT), as noted by Castells (2010). Consequently, this influence is shifting beyond the impact of knowledge creation to actual changes in the manner in which higher education is produced, practiced, and disseminated (Baker et al. 2012).

This paper explores several crosscutting themes: First, universities are exceptionally well suited to satisfy the needs of new markets for knowledge competencies. This includes the granting of degrees as well as preparing learners with a mix of competences that meet the needs of individuals and the workforces required by innovative industries. Second, universities must expand their reach, via virtualization of audience; that is, through digital technologies, they must increase adoption of virtual teaching and research approaches. In addition, development of university courses can contribute to the dissemination of both knowledge and competencies. This can
yield an enhanced supply of university trained individuals locally as well as in under-served areas and around the globe. And finally, the role of the university as nexus of social networks, one of the “value-added” characteristics of engagement in university life.

**Twenty-first century universities**

Universities are complex communities; transmission of knowledge is merely one of their many roles. The integration of research into curriculum, collaboration across systems, and cultivation of relationships with non-traditional educational partners, and cross-disciplinary initiatives, are all critical components of university functioning.

Institutions of higher education interact with a wide array of actors: faculty, researchers, governments and industry, NGOs and foundations. Innovation in education and research have been driven by advances in ICT which augments the type of interactions possible between teacher and student, between student and content, between researchers collocated or distant, as well as between university researchers and industry. Accessible online education and training offers possibilities for learning to those who are not able to take advantage of traditional in-person education. Of further impact is the potential for increased workforce development and maintenance of professional skills. Although university activities are occasionally dismissed as “just education,” many of these technologies and practices have application beyond the classroom, for workforce and employment training, as well as enhancing team and collaborative activities.

**Institutional innovation and change**

Universities expend significant resources on keeping pace with, and meeting the needs of an ever-changing world. But considering the rapidly changing economic landscape that challenges the skill-base of workers and professionals today, these institutions must change quickly—anticipating the needs of the populations they serve. Underutilized infrastructure could be reprogrammed for community uses, for instance to house project or entrepreneurial incubators, or even surplused. There will most likely be efforts to focus on and refine the notion of a “geographic” or physical campus. Online activities such as educational activities or collaborative research not only enable access to the best teachers and most robust material but also facilitate the formation of peer-to-peer communities of learning, virtual collaborative teams, and new forms of investigational endeavors.

For instance, open (free or low cost) online learning represents an alternative to traditional face-to-face learning experiences, and has generated a push back from traditional instructional faculties. In places that lack sufficient specialized educational options they represent a very real, and viable, route to economic and industry growth. While many of these online options are still predominantly in English, local institutions of higher education could provide translations in forums and localized learning communities; a low cost expansion of educational opportunities. Local universities could develop customized learning and training opportunities to increase the competitiveness of a workforce that otherwise might not have the opportunity to improve their skills.

Key issues facing policy makers include issues of socio-economic status (Morgan and Carey 2009; Chesters and Watson 2013; Leach 2013), which has long been a barrier to higher education. What accommodations might be made for those without the necessary technology? Cross-cultural collaborations are becoming easier and more common, but how will various parties interact, given language barriers? Finally, those with disabilities and functional limitations can potentially...
benefit from the proliferation of educational technologies, but how do we design learning environments to support access for all learners?

**Markets for knowledge competencies**

Virtually all online education material is in a digital format, generating streams of data that can be used to provide instructor feedback, identify difficult concepts, as well as improving learning outcomes. As software based digital instruction becomes more sophisticated, it is critical to remember that the availability of content is necessary, but not sufficient, to learning. Consumption of content does not automatically equal learning. Conversely, this affords universities the opportunity to develop and facilitate online learning experiences, particularly at fundamental or basic levels, freeing faculty to focus on more advanced or nuanced in-person experiences. The learning communities forming around these educational experiences can occur both virtually or physically with respectively different advantages, and disadvantages.

We propose a conceptual framework consisting of several components, including the learner/student, learning approaches and evaluative analytics, learning technology and knowledge networks that contribute to the development innovation in higher education. Internationally, there is not a consensus on the definitions of “twenty-first century skills,” despite being mentioned in regulations and guidelines with frequency (Ananiadou and Claro 2009). One model identifies three dimensions of skills as critical: cognitive (problem-solving and critical thinking), interpersonal (collaboration with peers, situated problems), and intrapersonal (e.g., self-discipline, adaptability) (Koenig 2011). So while technologies of content delivery and connectivity have advanced dramatically, one of the key characteristics of universities is the capacity to help develop these critical thinking and collaborative social skills. A globally competitive workforce demands more than just academic knowledge in a field, but also a mastery of the current technology used. This is another of the opportunities that the twenty-first century university can provide: freeing the delivery of educational, learning, and training experiences from the potentially geographically limited context of the institution.

Employers are beginning to look to work experience as much as academic success (Hodges 2011) as an indicator of work readiness. Surveys of employers suggest a perception that higher education is failing in teaching transferable skills to new graduates—and that they need additional on-the-job training before they can be relied on to contribute meaningfully to the workplace (Hodges 2011). While ICTs facilitate learning of content, universities still maintain an advantage in being able to instill community based soft and social skills such as teamwork and collaborative problem solving. While critical thinking and problem solving are not new skills, as they have been necessary components of human progress throughout history (Rotherham and Willingham 2010), they are considered to be even more critical as twenty-first century skills.

Increasingly, degrees are seen not as endpoints but rather starting points for lifelong learning. New technologies in the workplace demand new skills to use the technology and to be able to adapt to new work practices afforded by these technologies. These changes require workers to have a constantly refreshed set of skills. There are cases where an individual course— or even a series of workshops—may satisfy this need. The traditional four-year undergraduate degree, while still meaningful, leaves room for innovation in higher education content and practice. But this is a doubled-edged sword, as employers face an expanded set of credentials and certifications, and employees struggle with demonstrating the knowledge and skills they possess.

New pathways have been proposed that recognize competency as recognized by certificates and credentials, as well as via the traditional degree. Participation in a non-traditional (online) learning experience offers the opportunity to acquire basic knowledge. But as pathways open
up this kind of process could lead to a traditional degree for some people and something completely different for others. Drawing on Clayton M. Christensen’s concept of a product or service that is “good enough,”—not necessarily ideal, but sufficient to meet the needs of the user: adaptive learning that occurs just as it is needed rather than in a pre-packaged “degree” might serve larger social objectives of an appropriate prepared and competitive workforce.

The ability to aggregate, manipulate, and analyze large data streams, quantified and captured by learning platforms, is an enabling factor behind the development of learning analytics (Ferguson 2012). Software based learning analytics allows direct assessment and evaluation of the efficacy of various different kinds of learning approaches and content delivery. Learning analytics can potentially quantify factors leading to unsuccessful collegiate careers, enabling institutions to better understand why students drop out, and universities are closing the feedback loop by using the results of data analytics to help students change behaviors and habits (Johnson 2013).

Learning analytics are useful for generating insights on actual learning and for prediction of future behavior, but they can also be transformative, driving change of instruction, assessment, and administration (Siemens and Long 2011). The insights generated by learning analytics could potentially streamline the transition from community college to a four-year institution by identifying important skill sets necessary for a successful transition. Further, learning analytics are tools that could help instructors more quickly and accurately assess the range of student knowledge (Strader and Thille 2012), more readily linking teaching approaches to outcomes. Analytics can bring actionable feedback to students, instructors, instructional designers, and learning scientists, creating communities of learning (Strader and Thille 2012). A robust strategy of online collaborative activities could expand the portfolio of university IT departments in a facilitative function helping to manage higher education data analytics, especially if they engage other, non-traditional, research functions, and more broadly, external industry and interested parties.

**Competencies, assessment, and documentation**

Although accreditation models have focused to some degree on student learning outcomes, competency-based assessment focuses solely on the direct assessment of student knowledge. Motivated students could teach themselves, crafting unique bodies of knowledge, using aggregation of instructional material they find on the Internet or through other sources. Currently there are efforts to move in this direction, but they are primarily associated with courses in the more traditional sense. Several (US) state legislatures have proposed legislation to allow for assessment-for-credit options for basic education requirements, and currently there are regulations in place, federally for application for recognition from the Department of Education for self-paced, online, competency-based degree programs (DOE 2013).

The efficacy of many of the alternative approaches hangs on the development of valid and reliable assessments. Partnerships such as those between online education providers such as Coursera and accrediting bodies such as American Council on Education (ACE), designed to experiment with alternative learning certifications, have increased the urgency for developing assessments that measure what students know and can do, and are fundamental to competency-based programs. Developing high quality assessments is much harder to do than many realize. One concern is that institutions run the risk of granting degrees for test taking skills rather than for the skills and mastery of knowledge the tests are intended to measure. While there are some ideas that might help ensure test quality, such as massive test banks for online courses, the use
of portfolio-based assessments for some fields, and peer evaluation of work, there is much work to be done in this area.

The decision on how and where to learn shifts a greater responsibility to the student who must decide on the venue of learning, as well as on the best channel or provider of learning. Globalization also opens up markets for learning and education, so that more convenient, timely or matched opportunities become possible in a wider range of locations and contexts. Well-informed choices require objective, accurate data to make decisions on optimal paths to learning. A variety of external agents currently evaluate, assess, and categorize the various opportunities. There exist, however, significant differences in perceptions among academics, business leaders, and policy leaders about how this should work—a condition that complicates innovation. While there is agreement on the importance of accountability, they disagree how best to achieve these objectives (Bogue and Hall 2012).

An increasingly common viewpoint, as expressed, for instance, in the New America Foundation’s *Cracking the Credit Hour* holds that traditional accreditation is not well equipped to address the ever-evolving nature of higher education (Laitinen 2012). This raises the question of how the traditional accreditation model might be re-envisioned to be more responsive. While some accrediting bodies are taking strides toward updating their standards, such as the Western Association of Schools and Colleges (WASC) (US), other groups are taking more innovative approaches that range from lawmakers pushing for the accreditation of individual courses to educational technology developers supporting portable badges, or e-portfolios, that recognize and document specific accomplishments (Chatham-Carpenter 2010; Cheng and Chau 2013).

**The interplay between place and virtuality**

One of the most intriguing uses of information and communication technologies is the way in which they enable new communities and networks of interaction (Baker and Ward 2002). Collaborations, partnerships, and classrooms all involve forms of group interactions that are in essence, communities. Online and digital interactions are additional overlays of communications that run as counterparts to traditional face-to-face communities and partnerships, and allow engagement with collaborators that may or may not be physically located. So research activities and developmental partnerships that might be otherwise hindered by the divide between universities and surrounding industry and employers can be enhanced by a strategy of enabling virtual trans-disciplinary and inter-institutional communities.

The impact of virtual communities is especially evident in learning and education settings, but also illuminating in terms of less specialized collaborative processes (Liu 2007). Further, it appears that other factors, such as the implementation approach, impact the efficacy of online education. A meta-analysis of the literature (Means et al. 2013) found that, on average, students in online learning conditions performed modestly better than those receiving face-to-face instruction. It was interesting to note that the advantage over face-to-face classes was significant in those studies contrasting blended learning with traditional face-to-face instruction but not in those studies contrasting purely online with face-to-face conditions.

Insights gained from the ways in which communities of learning organize and operate can inform other kinds of collaborative community activities. This suggests the advantage of the two different approaches—online education as a potential expansion of the mission and outreach of the university to underserved populations, and the value that the university provides in terms of in-person, proximate learning communities, serving as a repository of knowledge for local industry.
The emergence of cheaper alternatives to traditional residential university education noted by Hanna (1998) has only grown more evident by the emergence of alternatives such as less expensive, non-residential access-oriented community colleges, proprietary for-profits, and both online venues offered by physical institutions and those that are purely online. New educational and learning opportunities, particularly ones such as MOOCs that are free or very low cost have great appeal. “Free,” ironically may also have associated costs as noted in a recent essay “Information wants to be free, but the world isn’t ready” (Sirius 2013).

A variety of business models are beginning to arise to deal with the issue of sustainability and affordability. For instance, one proposed system would be one of delayed payment—students only begin to pay off their tuition costs after they are making a certain level of income. This is not a new idea; there are examples of this extant in the United States, such as receiving medical education in exchange for military service, or providing medical services in remote or underserved areas. Online education offers this as an avenue (Moore 2005). Innovations such as the open courseware movement have the potential to dramatically increase student access to university resources, but are limited by society’s view of the purpose of teaching and education (Rhoads et al. 2013).

Universities, continuous education, and workforce innovation

Workforce development has historically been associated with industrial change, iteratively as both a driver and consequence of industry innovation. It is in this regard that a concerted effort could be made to reach across institutional boundaries to allow coalitions of universities as well as other actors to develop collaboratively based synergies centered on the role of new applications of knowledge (Eyster et al. 2013). These collaborations also offer enhanced opportunity for social knowledge distribution via virtual learning communities, as well as facilitating the integration of regional proximate, and online virtual communities. Workforce development can be defined as the delivery of an educational experience, such as professional education, that leads to graduates capable of commanding higher value in the labor marketplace. Conventional wisdom suggests that traditional faculty, representing a key constituency of the university, have not seen the development of work-specific skills as a central mission. Demand for “real-world, applied skills” has been viewed as a threat to the construct of the traditional university.

Employers use degrees as a low-cost sorting mechanism in an increasingly crowded and complex global marketplace, underscoring inherent workplace value in the specific knowledge, skills, abilities, and dispositions gained through the process of higher education. The wage gap itself between a university graduate and a worker with only a high school diploma has increased over the same time period from 40 percent in 1980, to 74 percent in 2010, with the expectation that by 2025 this gap will further widen to 96 percent (Carnevale 2011). Employment data from the United States consistently shows college graduates unemployment rates at less than half that of their high-school diploma only peers (BLS 2013). This gap suggests that there is an unfilled opportunity in terms of workforce development, that is, the provision of training and educational experiences delivered in virtual, or blended virtual and in-person contexts.

This increasingly workforce, skill-focused orientation of universities, especially in the United States, is in part because of increased degree attainment internationally. OECD member countries from 1997 through 2012 have increased tertiary education attainment from 18 percent to 28 percent (OECD 2012). In other words, globally competitive pressures from the success of universities in workforce development, accelerated through globalization of labor, intensifies demand for workforce development.
Students and parents increasingly see the university in this workforce development role, perhaps in an effort to justify the time and monetary investment in higher education. A 2010 Gallup and Lumina Foundation for Education poll reports that 69 percent of adults “strongly agree/agree” with the statement “Having a college degree is essential for getting a good job in this country.” On a more granular level, 86 percent of respondents list “to earn more money” or “to get a good job” as “the main reason why students get education beyond high school” (English 2011). Given global trends, this further supports the argument that institutions of higher education need to expand knowledge translations to individuals and regions that could economically benefit from expanded avenues to learning and skill development, in addition to tailoring learning options to the needs of different constituencies.

The formation of Western Governor’s University (WGU) in the United States in 1997 and its recent evolution, is an example of the reconceptualization of higher education organization and function. WGU, based on an online, competency based approach, provides select workforce-oriented degrees under a model that is learner-paced, rather than a pace set by administrators and faculty. The model values prior learning (competency) to determine starting points in knowledge acquisition, and disaggregates the role of faculty into teams of instructional designers, mentors, and assessors. WGU, although designated as a university, does not perform traditional research and has limited fields and degree offerings. Despite this limitation, the institution is formally supported by nineteen state governors, with 38,000 students currently enrolled (WGU 2013).

WGU, and other such programs (e.g., Southern New Hampshire University, and Wisconsin’s and Florida’s adult degree completion programs) align with professional literature from organizations promoting “completion” primarily for purposes of workforce development, with equity often as an underlying ultimate motivation. These sources include: the Lumina Foundation for Education, the Bill & Melinda Gates Foundation, Complete College America, the Council on Adult and Experiential Learning, and the National Governor’s Association, among others.

The changing role of a university could be one where emphasis is placed on the following functions: assessor and certifier of knowledge, rather than creator and transmitter; facilitator of individualized learning and a pace of progression largely determined by the student; and, improvement in affordability and workforce relevancy of programs.

The confluence of advances in ICT and educational delivery platforms are not just bystanders in the changing workforce development role, but enablers as well. WGU, for example, is entirely online, regionally agnostic, and logistically possible because of advances in ICT. It represents a step on the path toward a larger movement typically referred to as competency-based or, outcomes-based education. Competency-based approaches to education have the potential for assuring the quality and extent of learning, shortening the time to degree/certificate completion, developing stackable credentials that ease student transitions between school and work, and reducing the overall cost of education for both career–technical and degree programs (Bergeron 2013).

Universities face a combination of challenges and opportunities: demand for more targeted skill sets from employers, students, and politicians; an ICT ecosystem that enables fulfillment of these demands; a policy and regulatory landscape growing more amendable to new approaches; and, growing competitive pressures from non-traditional entities. Discussions of the role of the university and workforce development seem to have relied on an overly simplified assumption that workforce development always equates to specific training and anything of utilitarian value in the job marketplace does not belong in the university. Despite other potential benefits to students and faculty, the employment of new models of learning, including competency-based
education, even when not strongly aligned with workforce needs, may therefore be met with skepticism and suspicion.

Employer surveys signal increasing demand for skills that help produce “innovation in the workplace” and acknowledgment that roles today are more complex (Humphreys and Carnevale 2013); the rapid pace of economic change and unpredictability of needs calls for graduates that are apt at learning quickly and adaptable to new situations (DOL-BLS in Humphreys and Carnevale 2013); finally, employers also acknowledge the value of a balance of broad knowledge with specific skills (Humphreys and Carnevale 2013).

While specific skill based job training might provide short term benefits, it is unclear whether the individual and the public are better off with an education system that practices this separation and locks a subset of the population into a specific track. An alternative approach to workforce development focuses on continuous lifelong learning opportunities, as well as opportunities that can enhance and increase the competitiveness of regional economies and workforces.

Steps such as the Degree Qualifications Profile2 in the US, and the Tuning Process3 in Europe hint at ways to provide for a more connected student experience at different levels of higher education. The predominately post–baccalaureate user base of online educational learning could be viewed as a signal for unmet demand for lifelong learning opportunities. For the university of the twenty-first century hoping to remain relevant, a set of promising strategies emerges: a reinforcement of general education; embracing of the idea of continuous, lifelong learning, development of pathway partnerships to specific training institutions or employer developed certificates; disaggregation of roles allowing focus on learning and research; and adoption of tools for assessment and communication of valued skills and knowledge.

**University innovation and community economic impact**

In addition to the historic, inward facing role of student education, universities also operate with an outward facing role as drivers of innovation both physically, in their immediate locales as well as in terms of dissemination of knowledge. The historic university strengths of teaching and conduct of research, especially in some European countries, are reliant on state funding rather than on university–industry collaborations (Muscio et al. 2013), represent relatively untapped opportunities to collaborate with other actors across institutional boundaries. This is not a novel idea—universities have long existed as venues in which original ideas are developed, philosophical and ethical issues are debated, and creativity is rewarded (Breznitz and Feldman 2012).

A key avenue for the diffusion of innovation lies in the commercialization process. Universities’ engagement in commercialization of research began in the nineteenth century, following the two world wars (Breznitz and Ram 2013). Universities’ contribution to society during the wars had significant local economic impact. In particular, products and services were a result of university knowledge spillovers (Goldstein and Renault 2004; Lawton Smith and Bagchi-Sen 2011). Many believe that the economic impact of universities has a deeper root in the institutions’ mission statements and the way they perceive themselves as part of their region (Feldman and Breznitz 2009; Franzoni and Lisoni 2009; Breznitz 2011) originally in a geographic, but increasingly, in a virtual sense as well.

As noted above, universities contribute to their region through the education and job training of students, as well as in training and professional development efforts. Building a strong workforce is an immense contribution by universities to society and local economic growth. In remote areas, where universities may be the only option for job training and retraining, this makes their contribution indispensable. However, training a qualified labor force is typically an expensive
endeavor; it requires increasingly greater investment. As a rule no individual company can support such an investment, and therefore individual companies are not likely to make such an investment, especially if the output benefits other corporations (Kenney 1986). This condition helps support the rationale for university–industry partnerships, cross-industry partnership, and public–private partnerships, in addition to the traditional public sector, or NGO based efforts.

Modern industrial economic growth requires a highly trained workforce, something universities were in a position to provide (Scott 1977). The main source of university funding for applied research and the training of students has historically been governmental funding (Muscio et al. 2013). However, this reliance on public funding created a pressure on universities to make a return to society. As part of “paying back the community,” universities make contributions through teaching, research and development (R&D), collaborations, and technology transfer to industry (Minshall et al. 2007).

Research universities can become engines of local economic growth, through innovative efforts toward higher education, as well as professional development and on-going fine-tuning of existing worker skills, in addition to the more traditional deployment and commercialization of their research output. The outcome of these efforts can be seen in an analysis of universities’ ability to commercialize technology, a specific endpoint of the collaborative partnership between universities and industry. However, studies on universities’ commercialization practices and output indicate that technology commercialization is not performed equally at all universities nor is it equally rewarding everywhere (Feldman and Desrochers 2003; Lawton Smith and Bagchi-Sen 2011).

Many university faculty believe that they should conduct research for the sake of research, and as such they shun commercialization, and focus on skill development and technical training, while others embrace the commercialization opportunity and the ability to collaborate with industry. Some universities are more geared toward research and others toward commercialization (Lawton Smith and Bagchi-Sen 2011; Breznitz and Ram 2013). It is important to note that society’s expectations from universities are double edged: that universities will work on the most “disruptive” research and come out with the most revolutionary inventions, but at the same time they are expected to make direct economic contribution. These demands maybe found to be too much for universities to handle (Breznitz and Feldman 2012). It is the universities that successfully adapt to these changes that stand to survive as successful universities of the twenty-first century.

A major part of universities’ involvement in innovation is through its relationships with industry. By viewing these relationships in the context of national and regional innovation systems and the triple-helix theories, the environment in which universities operate and the relationship between firms and institutions emerge as important factors in influencing their ability to innovate and bring products to market (Nelson 1993; Etzkowitz 1995). Many academics, government officials, and industry representatives believe that universities should be involved with industry, and that there should be a relevant flow of information and knowledge from universities to industry (Schimank 1988; Jaffe et al. 1993; Saxenian 1994).

University science parks, in which the university is placed in a physical location suited to collaborative activities, are another method of collaboration with regional impact. In many cases universities provide land or funding for the construction of this kind of facility where companies and universities have a direct and simple way to collaborate. University incubators, on the other hand, are spaces within or in close proximity to universities in which university related spinouts are host. The fact that the move from a university laboratory to become a commercial firm, located in close proximity to a university provides stability and options for university–industry
collaborations and in many cases is the basis for a firm’s success (Massey et al. 1992; Rothaermel and Thursby 2005).

University–industry collaborations take many forms, including ones that emphasize human capital. Companies recruit university students (through internships and co-op programs, for instance), and graduates of universities. By placing their graduates in companies, universities build social networks that allow for future hires and possible funding through research projects and licensing. In turn, industry needs access to universities to acquire the best research, as well as employees who are knowledgeable in new technologies (Feldman 1999). It is only recently that universities have begun to build on the tremendous unrealized value of these networks—a resource that could have tremendous development potential. Further, universities license their technology to firms, and spin out firms based on universities’ research, and universities and industry collaborate on joint research projects. In some cases, universities have a particular project funded by a corporation and managed by academics at a university laboratory; in others, companies such Hitachi at the University of Cambridge, UK have established their own laboratories within a university department. In cases where these joint research projects result in a commercial invention, the university intellectual property (IP) policy will determine whether companies may have first right on inventions and a pipeline agreement (Hatakenaka 2002).

Partnerships, universities, and change

New partnerships and collaborations across systems, the cultivation of relationships with industry and non–traditional educational partners, and cross–disciplinary initiatives are critical to the sustainability of these new innovation based approaches to university functioning. The practicality of these collaborative efforts diverge globally due to a variety of cultural, social, and economic reasons, not all due to reluctance on the part of universities. A recent survey in Mexico, for instance, suggested that key reasons for lack of industry–university partnerships include lack of awareness of programs and opportunities, problems with matching students to opportunities and “lack of interest on the part of businesses” (University World News 2013).

We can expect that going forward, successful universities will be those that implement a diversified portfolio of functions and objectivities. Most fundamentally, it is a willingness to recognize and meet the changing needs and characteristics of learners in a globally connected context. This can be accomplished by awareness of the new markets and options for learners both inside and outside of the university, as well as by taking advantage of new forms of technology driven assessment and instructional approaches. A second key is to embrace the idea that learning needs to be lifelong and continuous. Skills and knowledge rapidly decay at the rates of global change; universities are well poised to take the lead in developing the idea of lifelong learning and the need to retune and retrain the workforce. Underscoring all this is the role of the university in developing knowledge, deploying applied approaches to the knowledge and as a node of innovation; critical to community and regional economic impact. Active outreach to industry will also serve both sectors well.

In consideration of the above, a variety of policy related questions are fertile ground for researchers working on the boundaries of politics, innovation, and economic development, given unpredictable levels of state (i.e., public sector) support, and the consequential appeal of alternative private–public and industry funding. What potential impact will these factors have on the independence of universities? What ICT based tools and practices will facilitate virtual research and development collaborations? What are the policy impacts of the changing higher education sector, not only on universities, but more broadly on industry innovation and workforce development? How much of the variation seen in the higher educational systems is a function
of size and geography of the nations they are embedded in, and what does this say for innovative practices? How will the changing approaches to learning and the dissemination of knowledge impact developing countries, both positively and negatively?

Changes in technology, an emerging view of the university as providing lifelong, continuous learning, as well as professional development, and the opportunities offered by competing channels for information flow have converged to challenge the roles and function of the traditional university. In order to survive in this competitive global marketplace, traditional institutions of higher education must proactively explore innovative and effective approaches not just to facilitate learning, but to be seen as a node for collaborative innovation and regional diffusion of knowledge. Conversely, the historic ambivalence of industry and government sectors to network with universities can result in missed opportunities to draw on the pure and applied research expertise of university researchers, and thus potentially be a barrier to enterprise innovation.

Notes
1 See, for instance a series of papers commissioned on the redesign of accreditation, www.wascsenior.org/redesign/conceptpapers.
2 http://degreeprofile.org/.
3 www.unideusto.org/tuningeu/.

References
Universities as drivers for innovation


Lawton Smith, H. and Bagchi-Sen, S., 2012: The Research University, entrepreneurship and regional
development: research propositions and current evidence. *Entrepreneurship and Regional Development* 24,


participants’ perceptions on building learning communities in online courses. *The Quarterly Review of Distance Education* 8(1), 9–24.

London: Routledge.

Means, B., Toyama, Y., Murphy, R.F. and Baki, M., 2013: The effectiveness of online and blended learning:
a meta-analysis of the empirical literature. *Teachers College Record* 115(3), pp. 1–47.


Morgan, T. and Carey, S., 2009: From open content to open course models: increasing access and enabling


Muscio, A., Quaglione, D. and Vallanti, G., 2013: Does government funding complement or substitute


Rhoads, R.A., Berdan J. and Toven-Lindsey, B., 2013: The open courseware movement in higher
education: unmasking power and raising questions about the movement’s democratic potential.

Rothaermel, F.T. and Thursby, M., 2005: University–incubator firm knowledge flows: assessing their impact


Saxenian, A., 1994: *Regional Advantage: Culture and competition in Silicon Valley and Route 128.* Cambridge,
MA: Harvard University Press.

Schimank, U., 1988: The contribution of university research to the technological innovation of the German


Sirius, R., 2013: Information wants to be free, but the world isn’t ready. *The Verge.* Available online at:


University World News, 2013: Missed opportunities for university–business partnerships. Available online at: