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Textbooks in an age of ubiquitous knowledge, competency-based education and MOOCs

Abstract:

This paper concerns the dislocation caused by sustained global economic uncertainly post-2008 and its impact on undergraduate university textbooks in the emerging age of ubiquitous knowledge, competency-based higher education and massive open online courses (MOOCs). The paper posits evidence that textbooks increase the cost of higher education, may be ill-suited to emergent personalized delivery, are being replaced by online open-content resource materials, become less relevant when the nexus between time-serving and course completion is broken, are likely to be replaced by syntheses of online materials as quality elements of instruction, and are unable to serve the transdisciplinary nature of emerging workplace contextualised university courses. The paper concludes that undergraduate textbooks are no longer an integral part of university provision in an era of ubiquitous knowledge and may be an impediment to quality education as universities slowly shift to competency-based education and MOOCs.

Biographical note:

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Introduction

Following sustained global economic uncertainly post-2008 which generated a decline in middle class incomes, high levels of youth unemployment and escalating higher education costs (Barber et al. 2013) in the USA and many other western countries, competency-based education and massive open online courses (MOOCs) have emerged as strategies to rectify perceived problems of cost and productivity in the provision of undergraduate higher education.

Competency-based education combines early twentieth century skills analysis aimed to boost the efficiency of industry by way of a routinely-skilled workforce (Allen 1919, Toops 1921, Charters 1924) with the outcomes philosophy of Bloom's taxonomy (1956). The USA flirted with competency outcomes for economic advantage from 1975 and during the economic rationalism of the 1980s in order to regain economic supremacy following the dominance of Japanese manufacturing (Popham 1978, Richards & Rodgers 2001). At that time, competency-based education was aligned with Deming's Total Quality Management statistical standards and observable measures (1982):

> Thus, we are assured, with the competency approach a dollar spent on education brings a dollar's worth of results. This 'common-sense' approach to educational efficiency is touted as the answer to individual employability and the key to … 'competitive edge' in the new global economy. The rhetoric is persuasive, even comforting, in these times of economic upheaval (Jackson 1989: 243).

Although higher education institutions eschewed the competency model in the 1980s, it is now being advocated by a number of Americam universities including the University of Maryland, Brandman University, Marylhurst University, Southern New Hampshire University, Western Governors University, Northern Arizona University and DePaul University (Klein-Collins 2012, Fain 2012).

MOOCs are online courses usually delivered by an amalgamation of provider institutions which share resources and so amass large-scale interactive participation and open access by way of the web.

> This emerging delivery regime is more than just a distribution mechanism; done right, it promises students faster, more consistent engagement with high-quality content, as well as measurable results. This innovation therefore has the potential to create enormous opportunities for students, employers, and star teachers even as it upends the cost structure and practices of traditional campuses (Dua 2013).

Ashenden refers to MOOCs as: 'the spectacular end of a "mega-trend" that is just getting into its stride, a change in the nature of change' (2013).

A new environment

Three models of competency-based education are discernible: outcomes, functional and vocational. The outcomes model defines educational goals as precise measurable descriptions of knowledge, skills, and behaviours in which students are assessed when they complete a unit of study (Richards & Rodgers 2001). The functional model

equates educational outcomes with life skills necessary for the individual to function proficiently in society (US Office of Education 1978 ctd by Savage 1993). The vocational model overtly applies the life-skills to job performance and survival in the work environment (Mrowicki 1986). The vocational model accords with contemporary policies of many western nations to align higher education with the national economic interest (Papadopolous 1996, McIntyre & Solomon 1999). Ball (1994) and Grubb (1996) refer to this as 'new vocationalism', but given demand by government, industry and students that the high cost investment in education result in employment, Mrowicki's definition of competency-based education still applies. This reads as:

> a description of the essential skills, knowledge, attitudes, and behaviours required for effective performance of a real-world task or activity. These activities may be related to any domain of life, though have typically been linked to the field of work and to social survival in a new environment (Mrowicki 1986: 144).

Barber et al. (2013: 24) cite the US National Center for Education Statistics which indicates that the cost of higher education is increasing faster than inflation (42 percent at US public institutions between 2000–2001 and 2010–2011). They cite data from the *Wall Street Journal* of 28 February 2013, which indicates that the total US student debt stands at nearly US$1 trillion (an increase of 51 percent between 2008 and 2012). The situation is similar in many western nations. Funding for higher education may not be sustainable at this rate. It is thus that Barber et al. assert: 'universities and departments will need to justify their existence – just ticking over won't be good enough' (2013: 50).

At the same time, the curriculum of many university courses is being questioned:

> for the majority of students who do not plan an academic career, the curriculum can sometimes seem esoteric or irrelevant. For many students it is the degree itself rather than the teaching and learning that really matters. A degree has currency in the labour market and while, as we have seen in some cases, its value may be falling, it is nevertheless a passport to a range of professional opportunities denied to those without one (Barber et al. 2013: 24).

MOOCs address the same problems with similar intentions. They threaten traditional universities because courses are available free (but not credentials), online, anywhere, anytime, and are operated by leading university brands including Stanford and (imminently) Harvard. They enrol hundreds of thousands of students. Notwithstanding the quality of provision, Stanford Professor Andy Fire observes:

> it's a lot cheaper just to educate all the people in this county with online education, and get rid of the state university, state college, and the odd community colleges (ctd by Cervini 2012).

Competency-based education and MOOCs as solutions

Competency-based higher education is advanced by advocates as a solution to the rising cost of higher education and more. Fain (2012) refers to it as an imminent

disruption to academic education. Its introduction is claimed to: advance personalized delivery by way of online provision; reduce time-serving; account for the ubiquity of knowledge; and, provide standards for the employment of graduates.

Similarly, the establishment of MOOCs responds to numerous studies concerning the lack of viability of the traditional university model. A recent Ernst & Young Report (2012) contends that structural changes in the media, retail and entertainment industries need to be applied to universities, or no Australian university will survive to 2025 with the current business model. One model the report advances is the 'transformer' model in which universities form partnerships with media companies and global technology providers to change the way education and knowledge is accessed and delivered. This corresponds with the MOOC model. The impact of the advance of competency-based education and MOOCs on the relevance of textbooks is, therefore, worthy of analysis.

Cost reduction

The impetus for competency-based higher education is the desire to provide lower-cost education options through flexible programs (Hill 2012b).

> From 1982 through 2007, tuition and fees at U.S. public and private colleges rose by an average of 439 percent after allowing for inflation. Three decades of 6 to 7 percent annual price increases have put college beyond the means of most families without resorting to huge student loans. (Deloitte 2012: 1)

In the USA, education loans exceed car loans and credit card debt and comprise the largest source of personal debt. Americans owe more than $1 trillion in student loans and almost one in five families are currently paying off a student loan (Watson 2013). The problem is common to all western economies. In Australia, the cost of a university education is tipped to soar 50 percent in the next decade (Herald Sun 2013). Student debt in Australia is already at an all-time high with an estimated A$6.2 billion of HELP student loans unlikely to be repaid (University of Melbourne 2013). Increased domestic undergraduate student numbers will require nearly A$7billion in government subsidies in 2015–2016, an increase from A$5.5billion in 2011–2012 (University of Melbourne 2103).

Koch claims that between 1986 and 2004, USA textbook prices rose 186 percent or more than 6 percent per annum, while other prices rose only 3 percent per annum, and that this had an affect on the cost of higher education:

> this has caused the overall price of higher education to increase significantly and has posed serious financial problems for the students and parents who must meet these burgeoning costs. These financial stresses have evidenced themselves in two ways. First, over time, student access to higher education has declined and second, students have taken more time to complete their programs of study (Koch 2006).

Working from Koch's base of US$1,009 in 2006–2007 and a 6 percent increase per annum thereafter, the cost will have risen circa 69 percent by 2016–2017. The cost of textbooks is exacerbated because the academics who choose the texts are not the

purchasers and about 10 percent of a textbook production run is given free to academics (Koch 2006). Because the unit sales of a textbook are highest in the first two years of publication (Koch 2006), publishers seek new editions which render earlier ones obsolete and so assure premium prices. Students in overseas countries typically pay even higher prices to cover freight and handling.

Given that the aim of competency-based education and MOOCs is to reduce costs, the textbook industry is a sure target. The increasing use of online materials, (see below), suggests that the future of the printed undergraduate textbook is limited.

Personalized delivery

Personalized delivery is advocated as a benefit of competency-based education (Hill 2012a) and, given the flexibility of courses, of MOOCs. Personalized delivery permits students to jump-start a degree using pre-testing to gain credits for prior learning and experience. Personalized delivery assumes individualized academic resources, personal mentoring, frequent assessment of student needs and learning styles, and customized strategies for success (Hill 2012a)

> We know two things about adult learners – they come to higher education knowing different things, and they learn at different rates. Competency-based education recognizes this reality and matches the education to the student. Unlike a one-size-fits-all approach, it allows adults to come back to college and apply what they've learned, either through formal education or their work and life experience (Mendenhall 2012).

Personalized delivery reduces the demand for standardised undergraduate textbooks – the highest volume of the textbook industry, and increases the demand for flexible modularised packets of information compiled according to individual need. Cost reduction is achieved by spreading materials (and their creative) over signficant numbers of students (The Economist 2012) and sharing these across multiple courses in multiple universities as per the MOOCs model.

Two MOOCs spawned by Stanford University, Udacity, capitalised at $15million with 475,000 students, and Coursera, capitalised at $16million with two million students, have already commenced this process. The Ivy League universities Harvard and MIT are following with edX, a $30million start-up MOOC (The Economist 2012). Online resources respond to the individuation which computer-mediated instruction delivers. Undergraduate textbooks in this environment are inflexible instruments rooted to the meta-narratives of the industrial age. As Barber et al. report: 'No responsible university today would let faculty members spend time writing a 'purpose built' textbook for their individual units' (2013: 41)

Online provision

Literature concerning the advantages of technology in competency-based education and MOOCs is voluminous. Gvaramadze (2012) advocates the virtual learning platform ALUD without actual and traditional face-to-face educational programmes. Juste and Lopez (2010) describe information technologies and virtual space for

competency-based education. Watkins and Schlosser (2002) refer to asynchronous online discussions and computer-based instruction. These are positioned as attractive because online education is cheaper than face-to-face delivery:

> the cost of delivering a four-year degree with only online curriculum (with instructors) is less than US$13,000 compared to US$28,000 and US$106,000 at typical public and private institutions respectively. As for the quality, from test scores to student satisfaction to graduation rates, outcomes have also improved according to NCAT (Deloitte 2012: 2).

However, currently only 7 percent of online programs at traditional higher education institutions are priced below the tuition of face-to-face programs, and there will be pressure for online course costs to fall (Hill 2012a). Poulin (2012) contends universities have failed to apply modern management techniques, thereby increasing online course costs with the employment of too many personnel – faculty, instructional designers, teaching assistants, and more. Poulin notes that cost reduction in other industries has been achieved by replacing labour with capital or with less expensive labour: to address the cost issue, you have to think about using people (especially teaching faculty) differently than in the traditional, face-to-face classroom model (Poulin 2012).

Hill (2012a) contends that it will be increasingly difficult for higher education institutions to maintain parity of tuition fees for online and face-to-face education, which Mendenhall refers to as necessitating a shift in the role of faculty from that of 'a sage on the stage' to a 'guide on the side' (2012). The resources to facilitate this shift already exist. MIT Open Courseware (MIT 2012), for example, provides open access to course notes and videos with referrals to online articles and sites. The provision of open-content textbooks, annotated texts and manuals through Wikibooks has the potential to formulate a no-cost alternative to textbooks. Apple iBooks attracted an estimated 350,000 text downloads within the first three days of availability in 2012 (Paczkowski 2012). The consequential reduction in the publisher-distributor-wholesaler-retailer supply chain is estimated to result in an 80 percent reduction of production costs compared to printed versions. With 90,000 downloads of iBooks Author, Apple's free textbook-creation tool, drawn-down during the first three days of operation (Paczkowski 2012) and the similar Amazon CreateSpace app (Amazon 2012), textbook authors are already moving rapidly online. The printed textbook is the casualty of the ubiquity of instant, online availability. Whether the online textbook survives the advocacy of personalized delivery is a moot point although indicators suggest it will not.

Time-serving

Competency-based education measures learning rather than time (Mendenhall 2012) such that student progression through a university course is evaluated by demonstrating mastery of knowledge and skills (competencies) regardless of the length of time taken.

> While more traditional models can and often do measure competency, they are time-based – courses last about four months, and students may advance only after they have put in the seat time (Mendenhall 2012).

Because mastery is the sole determinant of progress, Soares (2012) contends that any instructional method or instructional provider that moves a student toward mastery is theoretically acceptable. Dua (2013) envisages a future time when students will be able to credential themselves by way of MOOCs as a way to bolster their résumés. In this way:

> a big chunk of higher education may become vulnerable to the kind of disruption the music industry experienced a decade ago, as centrally controlled and distributed albums gave way, thanks to technology, to customized playlists assembled by individuals (Dua 2013).

In this environment, Latinen argues that online delivery has the potential for 'cracking the credit hour' (2012) – the rigidly enforced nexus between time-serving and traditional university progression. Students will be able to accelerate their progress and save both time and money. Mendenhall (2012) contends this should encourage the thirty-seven million American adults with college experience to complete a university degree thereby saving both time and money.

Given the flexibility which abrogation of time-serving delivers, students are able to choose as much or as little as they require from the competency-based education and MOOC menus. Regardless of choice, the result is the same: the purchase of a prescribed number of textbooks aligned with the duration of a university degree becomes variable when the nexus between time-serving and progression is broken. This diminishes the volume of textbooks necessary to be purchased for a course and eliminates the need for all students to purchase prescribed textbooks.

Ubiquitous knowledge

The ubiquity of knowledge in the 21st century is such that according to Barber et al. (2013), the content of a course in future is less likely to be as important as the quality of instruction, the nature of facilitated dialogue between students, the type of assessment and the path from university into the labour market. Barber et al. contend that neither university lecturers nor libraries any longer retain the hegemony over knowledge they formerly enjoyed and the power of the academy is reduced in consequence. This has implications for textbooks.

In April 2013, the indexed web contained approximately 14.08 billion pages (WorldWideWebSize.com 2013). If only 10 percent of pages have any scholarly value, the menu for potential academic reference is 1,408 billion pages. If only 1 percent has scholarly value, 140,800,000 pages are available. The web produces as much information in two days as humankind did from the beginning of time until 2003 (Siegler 2010). Given that most textbooks provide data a year old at the time of student purchase, updated Internet pages provide a better source of contemporary data.

While students increasingly turn to online information, academics uphold the value of scholarly journal articles. Jinha (2010) estimates that 50 million scholarly articles were published between 1665 and 2009. In 2011, 47,845 active peer-reviewed journals and scholarly periodicals were produced annually or more frequently (Simon Fraser University 2012). While access to journal articles might be free to students and academics through university libraries, the cost to the university can run as high $25,000 per annum per subscription whereby a large, multiple faculty university might pay around $10 million per annum for journal subscriptions (The Conversation 2011). These estimates are raw because physical and life science journals tend to be more expensive whereas arts and humanities journals tend to cost less. In order to reduce costs, universities are turning to pre-print versions of articles (prior to peer review) permitted by approximately 65 percent of journal publishers and available on Google (The Conversation 2011). How this affects subscription revenue is yet to be fully evaluated. However, the ubiquity of journal articles and the cost to universities are changing the way knowledge is being accessed.

The increasing use of mobile devices heralds two further changes. First, the networked collaboration of students to construct knowledge is replacing the academic expectation of the singular student (see Peng et al. 2009, May & Saitta 2010, Nelson & Zurita 2012). Second, the need for universities to synthesise ubiquitous and freely available knowledge into meaningful sets of knowledge to underpin student learning is becoming increasingly provided by organizations external to the university including think-tanks, public agencies, consultancies and practitioners (Barber et al. 2013). Synthesising knowledge is what textbooks and collections of academic journals once did. As these become increasingly unaffordable options, the synthesis of online materials is likely to be undertaken by competency-based educators and MOOCs as quality elements of instruction to distinguish their brand. This locks out textbooks.

Graduate employment standards

The advocacy of both competency-based education and MOOCs is increasingly aimed at the employment of graduates:

> This new model for delivering higher education will help us close the skills gap at an affordable price to get Wisconsin working again (Governor Walker ctd by Hill 2012a).

> … the education system needs to be at par with the human resource demand of the present century. The present world requires attainment of skills to work hand in hand with knowledge to ensure competencies in carrying out work (Hamdan 2010).

> Getting industry input is essential to make sure that we've identified relevant competencies (Mendenhall 2012).

Academics might express concern with industry input as this threatens their autonomy and it might well be asked which industry groups decide what needs to comprise university curricula and whether that curricula is transferable to all associated workplaces. However, Barber et al. perceive advantages:

as businesses themselves increasingly understand how the learning and development of their staff is a major differentiator, they too are becoming interested in collaborations with universities, which bring an external perspective, academic analysis, critique and recognition of the learning. Such collaborations can also assist with recruitment of talent (2013: 52).

Barber et al. embed a transdisciplinary dimension within future university-workplace relationships. Transdisciplinarity, defined with reference to the fourth trendline of Thompson Klein (2010), involves trans-sector and trans-disciplinary problem solving whereby knowledge is increasingly produced beyond disciplinarity (Gibbons et al. 1994) as a tradeable commodity with economic value (Nowotny et al. 2001):

> so much of the current innovation and emergent thinking is taking place at the boundaries of disciplines, making traditional departmental silos a barrier to progress. This is one of the major insights which influenced the recent radical redesign of Arizona State University [and] ... Duke University (Barber et al. 2013: 34).

Transdiciplinarity is set in the context of commercial enterprise where knowledge is not confined to the disciplinarity of a university faculty but which is across, between and beyond all disciplines (Nicolescu 2002). Textbooks traditionally serve disciplines. As courses become increasingly applied beyond the university to real-world workplaces, Barber et al. (2013) and Dua (2013) advance the notion of work being recognised by universities as part of learning and contributing to accreditation. Textbooks are likely to become the casualty of the changing priorities wrought by contextualised university-workplace courses because in this model curriculum is not fixed but is open to the environment, democratised and changeable (Malan 2000). No textbook can accommodate these attributes.

Future orientation

Neither advocacy for competency-based education nor the emergence of MOOCs heralds the demise of the Oxford University model. In fact, Oxford University does not envisage changing but, rather, perceives MOOCs as revolutionary only in scale while Cambridge states that it is not in the business of online education (The Economist 2012). It is noteworthy, however, that both Harvard and Stanford universities are investing in MOOCs although currently not for their on-campus academic courses.

The upshot of the competency-based education and MOOC models for less prestigious universities suggests that the quest for cost-reduction by way of online education will diminish the cross-subsidy between teaching and research as students increasingly seek cost-effective university degrees. This will leave institutions without a fee source for the research which nobody else will pay for (The Economist 2012).

The touted cost-reduction inherent in the recording of online lectures and the creation of online course materials in time is likely to follow the same path as all creative property. Education unions are likely to push for intellectual property rights, copyright

and residuals per drawdown for the academics creating the online resources. In the same way that film and music studios formerly owned the products of the artists, creators and directors outright, the requirement is now to share a percentage of income with all involved. Universities are likely to confront a similar demand which will impact the cost-reduction of online course provision.

Conclusion

New models of university education such as competency-based education and MOOCs respond to the high cost of university education and employer frustration with the abilities of graduates. Such models are poised to usher in a new credentialing system that is likely to compete with university degrees within a decade (Dua 2013). In these emerging environments, the demise of the undergraduate textbook, both printed and digital, appears inevitable. Students are future-oriented and are informed about what they have to achieve, how they will achieve it and the quality of its provision (Malan 2000). Textbooks are no longer an integral part of university provision in an era of ubiquitous knowledge, competency-based education and MOOCs. They add to the rising cost of higher education, may be anachronistic for personalized and online learning, are geared to time-serving, and cannot respond to the transdisciplinary requirements of contextualised workplaces.

> the cost–value equation will shift so rapidly in the years ahead, and employers will develop so great a stake in the new system they help design, that millions of students will probably flourish without ever setting foot on traditional campuses (Dua 2013).

In this environment, textbooks are to undergraduate education what vinyl records and CDs are to the delivery of recorded music. However, writers are creative individuals who are likely to adapt the written word to the morphed models of future undergraduate education and so create new opportunities for imparting knowledge.

Endnotes

1   Koch concedes that comparing textbook prices over decades is an apples and oranges comparison because products and distribution channels change. However, the exercise serves to demonstrate an aspect of the cost spiral.

2   Among Coursera's thirty-three partners are foreign universities including the universities of Edinburgh, Toronto and Melbourne (The Economist 2012).

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