Building the Global Open Education Infrastructure

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Abstract

We are entering an era in which educational content is free. The promise of open education is to permit anyone to study whatever they want regardless of barriers of location and income. This paper looks at the global landscape of four intersecting concepts: open education, distance education, public education, and free education. What does open education have to do to keep its promise of universally accessible higher education?

UNESCO's 2009 report on higher education described "massification" and its attendant issues of academic quality as well as the growing gap between physical infrastructure and enrollment trends. Within this framework, open education is an extension of accessibility trends that already visible through the spread of mass, distance education throughout both the developed and emerging worlds.

Open education is not up to its mission yet. Reuse of open educational resources is laborious. Search for appropriate courses and content yields heaps of unwanted results. Repositories and curated collections hold too many assets for ease-of-discoverability and too few for full-blown course development. Granularity is often at the level of assets rather than curricula.

The investment in physical infrastructure to support student enrollment growth in the coming years is beyond the capabilities of the public sector to fund. But we have to take the same challenge and apply it to distance and open education. What educational infrastructure do we need to develop an educated global citizenry capable of addressing growing challenges? Apply that question to the individual: what steps must be taken so that a young person can find others with whom to study, curricular paths leading toward productive citizenship and expert advice when he or she needs it? This paper starts from the promise of open education to describe the new supporting educational infrastructure – from policies to tools - that can make it a reality.

Sub-theme: Problems, Barriers, Reforms, and Solutions
Keywords: Open Education, OpenCourseware, OER, Chile, Korea, Colombia

Introduction

At the time of the writing of this paper, the world learned of the tragic death of a mother in South Africa, who had queued up with thousands of applicants looking for the last few spaces available at the University of Johannesburg (Polgreen, 2012). The basic facts of the case are clear. The University of Johannesburg experienced a surge in applications. It was able to admit only a small percentage of applicants, some 11,000 from a total of 85,000. A few spaces remained, attracting a crowd from the early hours of the morning. Finally, as some tried to scale the gates, they fell over, amidst a panic among those closest not to lose out.

Quite literally, if any single event called attention to the need to tear down the non-physical gates of the university system – the barriers to opportunity – this was it.

This event highlights the essential dilemma of higher education's ongoing transition from a system of elite education decades ago to what UNESCO 2009 report on higher education termed the "massification" of higher education. (UNESCO, 2009) Access to higher education is very precious as it confers on degree holders a significant earnings advantage throughout their lifetime. The issues of cost and access become intertwined as dual barriers to equal opportunity in an era in which higher education is increasingly seen as a universal right, the logical consequence of its massification. What is clear is that there is an inexorable increase in enrollment driven by growing employment insecurity for the lesser qualified in labor markets and higher net lifetime pay for those with university degrees

Internationally, the adoption of increased cost-sharing at public higher universities has sparked a broad public debate over the cost of higher education and the level of indebtedness it causes for students and their families. The policy issue that is sometimes confused with the economic issue of the budgetary contribution of governments to higher education is increasingly one of democratic access to higher education institutions, the gatekeepers to national and individual prosperity.

The barriers to the penetration of open education as a vehicle for low-cost, high quality education have been variously described as technical, legal or even educational. This paper argues that these barriers are being or will be solved. The issue is whether open education can fulfill its twin promises: access to higher education at a lower cost.

Increasingly, there is a heavy price to be paid for failure to find an egalitarian mechanism for these goals. This can be seen in the student demonstrations in South Korea, Chile, Colombia and even the United States. As universities falter in the face of public funding cuts, students find themselves on the receiving end of cost-sharing strategies and the search for private revenues for has led universities into an increasingly fierce competition with each other.

Barriers to Open Education

The 2007 Cape Town Education (The Cape Town Open Education Declaration, 2007) is a useful snapshot of what a representative community of open education advocates and practicioners considered to be the barriers to adoption: licensing, lack of awareness in educational circles, and access to computers.

The barriers don't stop here. The problem with the traditional goal of OER – reusability – are twofold. There is a profusion of finely grained OERs among thousands of individual websites and repositories. The cost and lack of ease of reuse is prohibitive. It is as if a university professor were offered the opportunity not to adopt a textbook, but rather handed hundreds of individual pages, with the "advantage" that he could fully customize it. University professors want, first of all, for someone knowledgeable to have written the text in the first place and then had it peer-reviewed, so that a priori the work to review the text would be worth it.

So, the problem of granularity of open resources leads to the problem of discoverability. As even the novice user

of Google knows, search engines yield a lot of unwanted results and even the ordering of the results that are humanly possible to comb through may be highly problematic. What learners want and need is to know that there is a vetted curricular path and that following it will allow them to move closer to their educational and/or employment goals. The importance of an MIT publishing *all* courses or the announcement from UNAM that materials from all coureses will be published is that an independent learner will trust in these institutions and their faculty. Furthermore, if the degree path is correlated to the OCW/OERs, then the independent learner has some assurance that their endpoint will be roughly equal to that of the elite university student.

In a recent paper, I argued that a search engine using machine learning techniques to troll through the thousands of university websites, could correlate OCW/OERs and, why not, copyrighted public materials with university degree paths. By relying only on the text of documents and not on the accuracy of either tagging decisions or metadata, the results could become both more inclusive and more accurate to authentic learning objectives. (Cooperman, 2011)

The further development of all-university OCW projects, of increasingly broader open textbook offerings, will make the content side of the barrier to open education fall away. And, if a country the size of Uruguay (<3.5 million) can create an RFP for a complete primary and educational content and learning management system, comprised of 1000 courses, then any government could make a similar request for a complete university content and learning management system, accessible by the entire population with a number of policies around the issuance of credit to remove the barriers of physical attendance and cost.

In short, there are really no technical barriers remaining. What is in short supply is the will to to both declare the objective of democratic access to higher education.

The problem no longer seems to be about the quantity of open content available, although there are surely concerns about quality of content in various subject areas. What was at first a drip of publicly available, free university course content opening a decade ago, is now a gusher, pouring forth across all continents and from a myriad of public and private institutions. The recent announcement of a form of low-cost, external credit by the pioneering university in OpenCourseWare, the Massachussetts Institute of Technology (MIT), is one more indicator of a global trend towards internet-mediated higher education based on free educational materials. The Saylor Foundation's development of peer-reviewed textbooks for the most common college degree programs is yet another major step forward.

Yet, before we declare victory, we have to disentangle the notion of abstractly having free access to higher education content from real opportunities. The early history of the kindred notions of OpenCourseWare (OCW) and Open Educational Resources (OCW) has been to further access to educational content disproportionately for those who already had access to formal higher education, not to mention internet access itself. Surveys conducted by MIT, for example, showed that a large percentage of searchers were already either graduate students or graduates with advanced degrees. Surely the goal of open education, first and foremost, is to provide access to those who would not otherwise have it.

This paper describes two scenarios: the promise of democratic access to higher education and today's reality of increased conflict over the issue of education.

The Case of South Korea

In South Korea, a combination of historical factors and recent increases in tuition costs led simultaneously to perhaps the highest demand for higher education combined with the lowest affordability of higher education. This combination of egalitarian tradition with intense competition for university placement set university attendance as an aspirational goal for their children at even more elevated levels than other countries. Among the other effects was the overbuilding of universities to meet demand. The gross enrollment ratio in South Korea is over 104 percent, compared to 84 percent in the United States.

Consider the case of the Korea Advanced Institute of Science and Technology, where attendance at elite science-oriented high schools, principal recommendations, and grades completely replaced grades. Furthermore, government scholarships meant that the students were initially allowed to study without tuition costs. The new university president, Suh Nam-pyo, a former MIT professor, modified the system to increase pressures on students to succeed. Free tuition would be partially forfeited for students not maintaining a 3.0 grade point average and courses were to be taught in English. (Woo, 2011)

But the fundamental issue for students and their families is the rising cost of tuition. In South Korea, the government shoulders relatively little of the financial burden for higher education, at least by OECD standards. Tuition was the second highest according to the 2009 OECD report. Tuition increases outpaced inflation during the period from 2006-2010: 28% rise versus a cumulative 16% increase in inflation.

The Case of Chile

Chile shares with Korea the dubious distinction of having the highest tuition costs relative to per capita GDP. Likewise, both Korea and Chile have relatively high percentages of total support for higher education coming from public sources. In the past decade, both have experienced significant tuition increases, sparking student protests. In 2009, Chilean students were paying between $5600 and $9200 tuition compared with a median household income of $8000 (by 2007).

But Chile stands apart because of its earlier elimination of a publicly funded secondary system in favor of a voucher system that funds both municipally run public schools as well as for-profit private schools. The 2011 university student protests follow by five years the 2006 "Penguin" protests, named for the school uniforms of the secondary students. In Chile, its unique system of educational funding was part of changes introduced during the Pinochet dictatorship (1973-1990). Eliminating the Ministry of Education as the controlling agency in national educational affairs, education was both decentralized to municipalities and private, for-profit education expanded dramatically. In the university sector, public funding for the "traditional" public universities dropped, while new for-profit universities entered the space. The decline of public funding for higher education led to a shifting of the burden onto students and their families, laying the basis for the recent events.

The Case of Colombia

In Colombia, a draft higher education reform law, Law No. 30, has led to student protests similar to Chile's in scope and even objectives. Colombia, unlike Chile, has no private for-profit sector in education. There are quality universities in both the private, non-profit and public sectors, but the lack of public investment in higher education has led to shortcomings in facilities in the public universities. Furthermore, with the exception of the elite universities, there are widespread complaints about the quality of education the students are receiving. These complaints led both private and public university students to join together in the protests, which resulted in the withdrawal of the proposal on November 9, 2011.

Its critics cited three types of problems with the new laws. First, they said that while it claimed to be part of the solution to the financing of public education, but that it would not solve a legacy of underfunding of higher education. Second, the law was unclear about the insertion of private enterprise in the public universities, because, at least in the research function, private enterprise already plays a role, so the funding of private enterprise for the university system, outside of research, was highly dubious. The third criticism and the one that was the flashpoint for the student protests was the creation of a for-profit university sector.

In the table below Colombia, like Chile and South Korea, has healthy growth rates, particularly from 2004-2010. Even in the recession of 2009, none of the countries had as sharp a decline in growth as the United States, even though it could be argued that through the price of commodities or, in the case of Korea, the decline in exports (cars, consumer electronics) to the United States could have been even more serious.

Figure 1. GDP growth

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Chile	-1	5.5	3.1	1.8	3.3	5.8	6.3	4.2	5.1	3.2	-1.5	5.3
Colombia	-5	3	1.5	2	3.7	3.6	5.2	6.8	8.2	2.5	0.8	4.3
South Korea	10	9		6.2	3.1	4.6	4	4.8	5	2.2	0.2	6.1
United States	4.1	5	0.3	2.45	3.1	4.4	3.2	3.2	2	1.1	-2.6	2.8

Source: World Bank (2011)

The same chart below shows the increase in the gross enrollment ratio, the measure of the percentage of the population

Figure 2. Comparing the four countries by public expenditure on higher education (public and private) per student as a percentage of per capita GDP.

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Chile	-	19.4	-	18	15	15.4	11.6	11.8	11.5	12.1	-	-
Colombia	37.7	29.6	30.3	23.4	-	20.7	19.4	16.9	-	26.7	27	-
South Korea	-	8.4	-	4.8	8.8	8.4	8.7	9	9	10.1	-	-
United States	26.8	-	31	25.3	26.2	23.1	23.1	25	21.7	21.1	-	-

Source: World Bank (2011)

When we compare those numbers to the gross tertiary enrollment ratio, we can see the cause of the squeeze in funding in Colombia, which nearly doubled its ratio in the years 1999-2009. Generally, as the enrollment ratio climbed, government support per pupil declined relative to GDP. South Korea is an outlier in the group, the only one which had increased levels of government support relative to per capita GDP. However, this came from a very low starting point in a system that places nearly all of the burden of higher education on students and their families.

Figure 3. Tertiary School Enrollment (1999-2010) (% gross)

Country	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Chile	38	37	-	41	43	43	48	47	52	55	59	-
Colombia	23	24	-	25	25	28	30	32	33	35	37	39
South Korea	74	79	83	86	88	90	93	98	102	104	104	-
United States	73	69	69	79	81	81	82	83	85	89	89	-

Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics. World Bank, School Enrollment, Tertiary (% gross)

Open Education in the Current Juncture

What this paper intends to correct is the lack of conversation within the open education movement (broadly conceived) about the precise manner in which openly licensed curricular materials can actually move a country – or the world – toward quality, higher education. What precisely are the transmission mechanisms in real terms by which open education functions to match learners with educational needs with a solution?

In the case of Colombia, we saw a higher education reform draft law that proposed to address the issue that 3.2 million graduates of the country's secondary system did not pursue further education, at a cost to the country that faces shortages of skilled technical and professional human resources. Obviously, the specific proposals generated lengthy student-led protests. But the description of the problem itself was generally shared. It would be a helpful framework for advocates of open education to describe the role of OCW/OERs in increasing educational quality, access, opportunity, and economic development.

In fact, while there are a handful of independent OCW-based university projects, there are few who would suggest that such projects will anytime soon replace or reform the university system as it is. All of these projects struggle with the issue of transferrable credit, so that students gain something that is more broadly recognized in the marketplace.

OERu is a project of WikiEducator and a variety of universities, including Athabasca University. It proposes a model of a university consortium that agrees in advance to a collaborative credentialing process, in which OERs are the exclusive component of coursework, academic volunteers provide academic support services (Taylor, 2007), and existing universities provide low-cost assessment services aligned with national or regional curriculum standards.

Mozilla Open Badges/Peer2Peer University. Mozilla's Open Badges project proposes a replacement path for university-based certification. Using the peer learning platform of Peer2Peer University, it has opened a "school of webcraft," a practicioner-oriented set of 35+ courses, most of which are not taught in traditional computer science curricula. Mozilla's Open Badges are peer-based certification of learning. They include badges not only for learning, but for recognized participation of the sort that would be valuable in a work team.

In the Mozilla/Peer2Peer University School of Webcraft, there is at least the notion that a replacement mechanism is being offered in two ways. First, the use of peer education contrasts neatly with the lecture/discussion format that is used through the tertiary sector. Universities already are engaged with peer learning and there are research studies that shows its efficacy in Science, Technology, Engineering and Math Education (STEM). "The evidence indicates, moreover, that most students who sit passively in lectures for an entire course are unlikely to appropriately link their prior conceptions to the new knowledge being presented." (McCray, DeHaan, & Schuck, 2003).

The second replacement mechanism lies in an assessment/certification process that effectively bypasses the traditional university. We may see Mozilla's offer as an example for what they hope to see happen – an employer-led recognition of alternative credentialing paths.

However, still more likely is that prominent universities will be providing open courses for external audiences. The Massachussetts Institute of Technology (MIT), which opened the doors of higher education to OpenCourseWare with its 2001 announcement, has followed on by suggesting that it would provide, at least in the computer sciences and engineering, an external certification at a low price point. This action follows the announcement by the National Autonomous University of Mexico (UNAM) that it would be providing materials for some 300 courses, as well as theses and research, in openly licensed format. (Ambrus, 2011)

It will have to be a combination of these developments, including peer-based education, recognized alternative assessments, credit transfer mechanisms, and university-vetted degree paths, to begin to trace a mechanism by which open education becomes an established mechanism for a universal right to a higher education and the actual fulfillment of unmet demand for higher education

Conclusion

Is it possible to build an open education ecosystem, built on both the highest quality educational materials better and improved pedagogy through peer-led study, one that is transformative of the traditional university as well? Consider these elements:

1. Integrated, course- and curricular-length open content, supplemented by open textbooks, organized along the lines of degree paths in the universities, including in their rich diversity along national and regional lines.
2. A scalable peer-led platform combining skilled moderators and access to expert just-in-time support.
3. A credit-transfer mechanism leading to degrees of the same value as other nationally accredited degree programs.
4. An administrative component that handles at national levels the necessary functioning of recordkeeping.

The glue that can tie together these new elements exists in national policy, including necessary funding of the inclusion of open education in the functioning of ministries of education, particularly for national assessments and credentialing. This democratic right to higher education is a continuation of national policies for free, universal primary and secondary education, which, while still incomplete in many parts of the world, have formed the basis for national economic development.

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