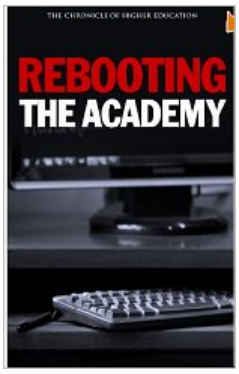
Educational technology for equity



The Chronicle of Higher Education has published their first ebook, ***Rebooting the Academy***, which arose from the interviews they did for a **piece** earlier in the year on "tech innovators". The essay I wrote on educational technology for equity was declared "too academic", and definitely no footnotes allowed, which was an interesting exercise in genres and attribution, from my perspective! So here is the original piece, footnotes and all…

Introduction
Whose interests does educational technology serve? For which ends is it pursued and which of the current trends are most relevant to advancing the equity agenda? How can equity be kept foregrounded when universities globally, and in Africa in particular are under serious pressure? The current turmoil derives from a complex interplay of factors including the massification of tertiary systems, the impacts of information and communications technology, globalisation and the rise of the knowledge economy.**[i]** Permeating the challenges in universities are issues associated with participation, throughput and successful learning. Using the South African context as a focus, this piece considers how some current trends in educational technology can contribute to addressing these issues.

Challenges within the system- South Africa
The digital divide often refers to discrepancies between countries or continents, but it is salutatory to remember (as Castells reminds) of the pressing divides within countries, within communities and even within single universities. Digital divides are of course, closely related to social divides, and South Africa is one of the most unequal societies in the world. Indeed, a 2012 report states that South Africa has the most unequal income distribution in the world, at 63.6%**[ii]**. The poorest 20% of the South African population accounts for 2% of consumption: the richest 20% of the population account for 66.5% of total consumption (Prabhala 2005).

The social divides permeate the education system where there is a serious disparity of learning achievement by socioeconomic status and geography. At grade school for example, higher reading scores are attained by pupils predominantly from the wealthiest SES (socio-economic status) quartile in urban schools**[iii]**. At the university level, an examination of the student age group demographics is sobering. Of the total enrolment in 2005 as a percentage of 20-24 age-group: white students comprising 60% while black students formed 40% **[iv]** (while in the general population, white people make up less than 10%). The inequity of outcomes is especially sobering. Less than a third of students (30%) graduate within five years, and indeed it is estimated that under 45% of the intake will ever graduate. In most residential university programmes, black graduation rates are under half of those for whites, and there are fewer black than white graduates. The net effect is that under 5% of the 20-24 year-old black age-group are succeeding in any form of higher education**[v]** (Scott 2009).

Responses
Multipronged
Given the extent and deep structural roots of these problems, it is clear that there are no quick fixes, and that the underlying social and economic causes of inequality, poverty and unequal development must be addressed for profound change in education to occur. Within the education system itself, multipronged responses are required across different dimensions of which technology-enabled interventions are important though they are not the cure-all they are sometimes touted to be.

The digital
Having sounded these cautions, it has to be recognised that technology pervades the entire system. It is both a cause and a consequence of change in higher education as increasingly the digital infiltrates everything. This means that the foundational characteristics (the affordances) of the digital permeate the three key value points for learners in universities enabling the reshaping of:

content (access to and apprenticeship to disciplinary knowledge, content creation) ;
interaction (between peers, between students and academic experts through pedagogy, feedback and engagement) ; and
accreditation (summative evaluation and certification).

Opportunities in Current Trends
Which of the current digital trends are relevant, especially to students on the wrong side of the divides, and particularly those who struggle with participation and success? Three in particular are germane and intersect in ways which previously were not possible:

the move to openness (in general, and in this instance to open content);
the growth of rich media content (especially that which is openly available); and
the ubiquity of cell phones (with the concomitant possibilities for mobile learning, increased interaction, content access and content creation).

Together, these create synergies with potent possibilities.

Open & media-rich content

The move towards openness in higher education is an opportunity for increased inclusion, and expanded access as well as better pedagogy and improved success rates.

At the simplest level, the availability of open (freely available, re-usable) content is of obvious benefit to students for whom the costs of textbooks is actually and relatively too high (one South African study calculated that the cost of a year's learning materials was as much as one third of the cost of tuition[vi]). The move to making and sharing content intrinsic to Web 2.0 blurs the line between the formal and the informal, and also means that content which would not be published by commercial publishers is made easily available online, increasing the pool of suitable local case studies and local educational resources.

The rise of rich media is also obviously advantageous to students, for the learning process and for those at an educational disadvantage. There is an explosion in video (user uploads to YouTube alone hit one hour per second in March 2012 , sixty hours per minute[vii]) and of this video a substantial sub-set is of educational value. There is a concomitant rise in audio and podcasting, as well as animations and interactive visualisations (e.g. representations of science "big data" and rich resources from the digital humanities). The value of the "audio-visual" is well documented in education, creating opportunities for interactivity, modelling, improved learner engagement, and support for different types of learning "styles" and so on.

What is new is the prevalence and indeed the assumption of this rich media as a matter of course, as well as the fact that much of this content is freely available. The mainstreaming of open licensing is a great step forward in this regard. A recent example is laudable – the inclusion in July 2012 of Creative Commons license for YouTube uploading, which was launched with a CC library featuring 10,000 videos [viii].

However, an obvious question is how those without computers or connectivity, or those without adequate bandwidth, benefit from and contribute to this abundance of online content?

Mobiles

Cell phones in South Africa and beyond are a great opportunity for three reasons: ubiquity, interaction and content.

There are more cell phones in South Africa than there are flush toilets[ix] . Mobile cell coverage is at nearly 90%, and there were 101 mobile cell subscriptions per 100 people in South Africa in 2010, according to the World Bank[x]. Cell phones are ubiquitous across all strata of society, especially the student population[xi] where they are highly regarded, and where they are prioritised on limited, stretched student budgets.

Of course, relative cell phone functionality has to be taken into account. Yet even basic phones offer opportunities for interaction, communication and some content creation. A review of the many experimental projects in mobile learning notes that SMS (texting) remains key [xii] and examples of SMS cases for learning abound. These include the use of mobiles for interaction and feedback in large class interaction[xiii], as well as SMS / web integration communication tools for questions and answers in online learning environments[xiv]. One of the numerous successful mobile maths m-learning projects is the Dr Maths Project which uses both SMS and the web for students to interact with volunteer tutors[xv].

At the same time, mobile web access is rising rapidly across the population. Even in South African rural areas, it was calculated that 27% of rural users were browsing the Internet on their phones in 2011[xvi]. Amongst the student population the proportion of cellphone users with web access is much higher. At the University of Cape Town, a 2011 investigation found that 85% of respondents to a survey reported owning smartphones. At the country's large distance education university, with 350 000 students across Africa, 82% of online respondents and 55% of paper-based respondents reported owning a phone with Internet access. This survey concluded that the mobile phone is a key entry point for Internet adoption, narrowing both and the data gap and being increasingly used to access the Internet by all students[xvii] .

Obviously mobile internet enables increased access to online content. Some open resources are designed specifically to include mobile devices, with local examples being Siyavula (open content endorsed by the National Department of Basic Education[xviii]) as well as cell phone novels, delivered in chunks (eg Yoza – http://www.yoza.mobi/). Another exciting example is the Wikipedia partnership with Orange Telecom which is waiving data fees, thus allowing its 70 million cell phone users in Africa and the Middle East free access to Wikipedia[xix]. In many other cases, research shows that students take matters into their own hands, by, for example, independently recording (and sharing their lectures), so that they can listen and repeat in their own time later[xx].

Mobile-enabled content creation is becoming more common (the 2011 AMPS survey records the making of video recordings on cell phones at 22.5%) which bodes well for righting the imbalances of content online, where certain communities and countries are severely under-represented. And from a learning perspective, these practices support the known value of "learning by doing". Other sim-enabled devices especially tablet computers offer even more potential for content creation and access; interestingly tablets are currently the fastest ramping mobile device globally.[xxi]

While there are relatively few tablets presently in South Africa (estimated at 325 000[xxii]), it is reasonable to assume that, as elsewhere this will increase, given the development of tablets as low in price as $35[xxiii]. Solar-powered tablets are especially relevant [xxiv] where electricity is either lacking or intermittent, but sunshine is not. Such devices have the ability to house entire libraries of rich media for students with serious constraints accessing learning resources of any kind (lack of books is the dominant problem in schools, according to Statistics South Africa[xxv]). As open content becomes mainstream and emergent open etextbooks models (such as OpenStax, and Flat World Books) become more widely known, it becomes a realistic possibility for students to have access to extensive content at very low cost.

Conclusion

At the same time, there are risks and dangers. New technologies enable closed-down practices in ways that old technologies do not – think of libraries enabling sharing of books while licensed downloads of ebooks do not. Ground-breaking developments in new devices, online environments and platforms are expensive and may only be available to those who can afford them, creating the possibility of new divides. There is a real danger that innovations in educational technology will primarily benefit those students who are already advantaged with the economic and cultural capital to exploit them and in a good position to experiment with innovation.

However, based on the open-web and premised on emerging digitally-mediated social practices, the key trends of openness, mobiles, and rich media coalesce to enable numerous opportunities for education. Innovative experiments and case studies point to ways of engaging with the content and interaction at the heart of pedagogy and the curriculum. These all are cause for optimism in contexts where participation and success, and digital and social inclusions, are major imperatives.

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[i] Altbach, P; Reisberg, L & Rumbley, L 2009, Trends in Global Higher Education: Tracking an academic revolution. Report for UNESCO World Conference on Higher Education

[ii] See http://blog.euromonitor.com/2012/03/special-report-income-inequality-ris...

[iii] Smith, M (2010) Which in and out of school factors explain variations on learning across different socio-economic groups: finding from South Africa, EdQual Working Paper No.24, at http://www.edqual.org/publications/workingpaper/edqualwp24

[iv] A closer breakdown of the figures is even more sobering: Indian- 51%, Coloured – 12%, Black/African 12%. See Scott, I (2009) from which this section is extracted. Scott, I, 2009 Towards an Agenda for SoTL in Africa? *International Journal for the Scholarship of Teaching and Learning* Vol. 3, No. 1 http://www.georgiasouthern.edu/ijsotl

[v] First-time entering student cohort studies , Letseka, M. and Maile, S. (2008). High university drop-out rates: a threat to South Africa's future. Pretoria: Human Sciences Research Council, and Scott, I., Yeld, N. and Hendry, J. (2007). A case for improving teaching and learning in South African higher education. *Higher Education Monitor No. 6*. Pretoria: Council on Higher Education. http://www.che.ac.za/documents/d000155/index.php. Also http://www.ieasa.studysa.org/resources/Study_SA/Facts_Figures_section.pdf

[vi] Prabhala, A (2005) "Economic Analysis of Income and Expenditure Patterns in South Africa: Implications for the Affordability of Essential Learning Materials," A2LMSA working paper, Johannesburg. http://www.aca2k.org/en/projects/a2lmsa.html

[vii] Doctorow, C 29 March 2012, User uploads to YouTube hit one hour per second, , http://boingboing.net/2012/03/29/user-uploads-to-youtube-hit-on.html

[viii] See http://creativecommons.org/weblog/entry/27533

[ix] According to AMPS at http://www.saarf.co.za/, in 2010 25.1 million adults (15+) personally owned, rented or had use of a cellphone. 20.7 million had a flush toilet in the homes or on their properties.

[x] See World Bank Data http://data.worldbank.org/indicator/IT.CEL.SETS.P2

[xi] Specific details of cell phone ownership and use by all South African students are not available. Research amongst school children research shows that 98-99% of high school learners across all school types owned a cell phone (Tustin, D, van Aardt, I & Shai, 2009, New media usage and behaviour among adolescents in selected schools of Gauteng, UNISA).

[xii] Winters, N 2012, Learning and Technology in the Global South, at http://www.slideshare.net/niall/learning-and-technology-in-the-global-south

[xiii] See for example, Jones, M, Marsden, G & Gruijters, D (2005) Using mobile phones and PD in Banks, D (Ed) *Audience response systems in higher education*, IGI Global

[xiv] See for example Ng'ambi, D. & Brown, I. (2009). Intended and Unintended Consequences of Student Use of an Online Questioning Environment. In *British Journal of Educational Technology*, 40(2):316-328.

[xv] See http://drmath.meraka.csir.co.za/drmath/tutors.html

[xvi] The Mobility 2011 research project, (World Wide Worx) reports that 39% of urban South Africans and 27% of rural users are now browsing the Internet on their phones. https://www.fnb.co.za/news/archive/2011/20110202users.html

[xvii] Hanlie Liebenberg. H and Chetty, Y (2011) Student ICT Survey: High-level Analysis Presentation, University of South Africa, unpublished presentation

[xviii] See http://www.iol.co.za/news/south-africa/siyavula-project-to-help-solve-textbook-crisis-1.1084332 and http://m.everythingmaths.co.za/

[xix] See http://www.guardian.co.uk/technology/2012/jan/24/orange-wikipedia-mobile...

[xx] See for example **Czerniewicz, L., Williams, K., & Brown, C. (2009).** Students make a plan: understanding student agency in constraining conditions. In *ALT-J Research in Learning Technology*, 17 (2).

[xxi] Morgan Stanley Blue Paper 2011, Tablet Demand and Disruption, Mobile Users Come of Age, at http://www.morganstanley.com/views/perspectives/tablets_demand.pdf

[xxii] Goldstuck, A 22 March 2012 Tablets aren't taking off in emerging markets? Think again http://memeburn.com/2012/03/tablets-arent-taking-off-in-emerging-markets-think-again/

[xxiii] India launched what it dubbed the world's cheapest tablet computer Wednesday, to be sold to students at the subsidized price of $35 and later in shops for about $60. http://www.reuters.com/article/2011/10/05/us-india-tablet-idUSTRE7940YV2...)

[xxiv] http://www.technologynext.org/35-solar-powered-tablet-pc-in-india/ and http://www.smartplanet.com/blog/intelligent-energy/a-solar-powered-table...

[xxv] Department of Basic Education (2012) General Household Survey 2010 Focus on Schooling, at www.education.gov.za/LinkClick.aspx?fileticket…tabid=422

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