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BEYOND “APPROPRIATE” TECHNOLOGY

Mobilizing education for development

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Abstract. Having established that technology mediated instruction of some kind has potential and a valuable role to play in education for on the move and remote area learners the paper looks at practice as documented and suggests that social and cultural barriers are a greater challenge than technological ones. It concludes by suggesting that successful implementation may depend both on use of familiar technology i.e. phones rather than internet, and establishing for users a social and cultural validity for using that technology for the delivery of education.

1. Context

Gulati (2008), providing a very comprehensive review of “technology-enhanced learning in developing nations”, poses the question “is e-learning working?” since a previous study of 150 distance education programmes had concluded:

‘...traditional, paper-based means of distance learning continues to be more reliable, sustainable, and widely used than online and Web-based methods of learning (Leary & Berge, 2006).’ (Gulati, 2008)

Gulati adds that there are multiple determinants that may influence the outcomes of any initiative and suggests there is no sure fire model for success,

‘...e-learning does have the potential to meet the educational needs of masses of poor people in developing countries; however, this potential has yet to be recognised. ... in many cases where there is limited IT infrastructure, traditional technologies such as printed material, radio, and television remain more effective and accessible for rural and disadvantaged groups.’ (Gulati, 2008)

But, this is not to say that elearning has no value in developing contexts,

‘The implication is quite the opposite. ... the need for holistic policies that acknowledge these challenges and focus on basic and primary educational infrastructure to support low-cost, higher quality access in rural and deprived areas. This is important not only for equal access to learning, but also so that different groups may have the opportunity to contribute to the development of global knowledge. (Gulati, 2008)

Indeed use of ‘traditional’ technology in education is still pushing back boundaries and widening access by incorporating new techniques. Radio, for example, which is already well established, well understood and readily available is continually improving interactivity by increasing the amount of user content included and extending reception range using new transmission techniques etc.

‘...the South African Radio Learning Programme has been able to demonstrate the potential of radio as a low-cost ICT when used at scale (Cobbe, 1995). In December 2004, there were 48,000 teachers and 1.6 million learners involved in open and distance learning through the support activities offered by the Radio Learning Programme, at a cost of approximately US\$3 per learner per annum.’ (Potter & Naidoo, 2006)

‘...informal rural learning in India ...combines radio transmission in rural areas with local face-to-face discussions ...programmes include talks, interviews, discussions and songs’ (Berman, 2008)

Certain issues e.g. HIV/AIDS and sector specific needs for education e.g. sex workers, youth etc. are also acting as drivers for change in programme development and resulting in content that goes beyond basic literacy or skills. In some places, e.g. DR Congo, community based radio stations offer local support and may later become the driving force behind new initiatives and programmes. Community radio also has widespread support from donors, probably the most important guide to operating community radio programmes is produced by UNESCO (UNESCO, 2008).

2. Potential

The 1980s mantra of ‘appropriate technology’ was a response to earlier misguided attempts to kick start development by having the west export physical technology such as farm or domestic machinery. This was premised on the idea that it was absence of tools that was limiting production and thus economic and social growth and development. “Appropriate”, as a concept, served then to focus minds on issues of context so that, for example, account was taken of sustainability issues, of availability of spare parts, skilled maintenance, consumables etc. in deciding which tools were needed or useful. Presently the pace of change and technical development means that establishing a status quo from which to evaluate the usefulness and appropriateness of any mobile technology for developing countries is a challenge – daily boundaries are shifting and barriers are being lowered.

Many frequently cited issues are no longer critical. The availability of electricity, for example is one such, solar power can be harnessed by most of the ICT tools that any education initiative might wish to use. Although not especially attractive to users there is even a wind-up radio, that does not require electricity or batteries at all, made specifically for use in developing countries. The Bee, a portable solar powered

communications hub (developed by UNICEF for use in remote areas or emergency situations) is a perfect example of the sea change underway, its key feature being the ability to adapt to different inputs and thus to connect equally via satellite, wireless or fixed connection. Potentially, there is a huge range of resources that can be used to mobilize education and other development programmes globally. A few specifics, below, indicate the extent of services that could be made available to meet the need identified by Gulati, above, 'to support low-cost, higher quality access in rural and deprived areas'.

2.1. LAPTOPS AND NETBOOKS

The best known initiative is probably One Laptop Per Child (OLPC) (<http://laptop.org/en/>) but there is also the Intel Classmate option too (<http://www.classmatepc.com/>) Both seek to be appropriate for local conditions without compromising on functionality e.g. they have wireless capability. The critical issue for sustainability is the maintenance and upkeep of machines and servers, a matter of human expertise rather than of physical resources. Some critics have suggested that laptop initiatives are a distraction for students taking them away from more valuable use of their time (ICT4D, 2009). Equally, however, agencies such as UNESCO point out that unless all students have the option not only to access computers and technology but also to have them integrated into their lives they will continue to lack essential 21st century skills and experience. Others suggest that OLPC is a misguided approach since it offers less than a full product, but they do point out that the OLPC and similar initiatives have led to development of netbooks which are serviceable and valued in both developed and developing environments (Project Diaspora blog, 2010)

2.2. MOBILE MULTIMEDIA PLAYERS, MP3 PLAYERS, IPODS, PDAS ETC.

Although as yet undocumented in the literature, the UK Open University is presently testing the potential of iPods, MP3 players and similar devices to deliver multimedia content to trainee teachers in both urban and remote rural locations. The devices are loaded centrally with staff development material as well as resources for classroom use with students (usable in classrooms via suitable docking/speaker units). Devices have longlife rechargeable batteries which can be charged either via mains, car battery or solar means. Such multimedia content could also be delivered via standard latest generation mobile phones, although the interface of an iPhone is arguably easier to navigate.

Within the context of potential content, podcasts are composite multimedia files, often of audio content but they may also contain video and fixed image content. These are particularly popular for packaging content from radio broadcasts so that this can be used on demand, generally on subscription, for regular, e.g. daily or weekly, automatic download to phones and MP3 players.

Central storage of multimedia content for use on phones or other media players can be effected either locally on a standalone server or locally/regionally/globally, in shared space. Greenstone (<http://www.greenstone.org/>) is one open source solution. Purchasing an e-Granary (<http://www.widernet.org/digitallibrary/>) is another which is designed

specifically to provide quality resources where there is no, or limited, Internet connectivity.

And, potentially the most interesting mobile technology, globally not just in developing countries is the mobile phone.

2.3. MOBILE PHONES AND SMS

Mobile phone ownership and use continues to increase rapidly in Africa (Mobile Africa blog, 2009). In some places this involves shared phone ownership or public access options but largely phones are owned and used by individuals. Use for messaging (SMS) is far greater than use for voice calls. Increasingly mobile internet access is also possible. Many view SMS as offering the greatest potential for improving educational access e.g. Traxler & Dearden (2005) suggest that, for Kenya, SMS could not only help deliver quality education it could also help support systems and educational administration, collection of data etc. This point has been documented in other contexts too as a means of offering integrated support to the development of formal educational programmes (Jones, 2009). The in-built support for data collection potentially also addresses the issue of how to monitor control procedures, grades etc. when providing an accredited programme for peripatetic students. Mass dissemination/collection of SMS can be actioned via either a mobile telephone network itself directly, or via computer. It is also possible to create local networks via PC and then have only collected data uploaded and centralized via wireless or satellite connection to the phone network.

Experiments with offering educational content via mobile phone have been undertaken by both Athabasca University and the Open University and studies are in preparation. Broadly these suggest that mobile delivery is less suitable for delivery of new content than for reinforcement of content previously studied via other means either print or online,

‘the major focus of m-learning should be more on communication and interaction than on content’ (Brown, 2003)

In this case the phone becomes a connector, as much as an author of new knowledge.

In the case of Athabasca, language skills and drills have been delivered effectively this way. In the case of the Open University (using the same shared open source software) information literacy and workplace information seeking and retrieval skills have been delivered (see <http://iknow.open.ac.uk/wordpress/>).

Although African mobile phone subscribers have favoured text and data use there are wider possibilities,

‘Another benefit of m-learning is mobile devices have certain capabilities that can be delivered with greater ease than other electronic devices. Clark, cited by Shepherd (2001:2of5), points out that: "The mobile phone also has one facility that makes it better than most PCs. It has been designed to deliver audio. You can listen to, or even talk with, a real person. It is this mix of audio and text that makes the delivery of certain types of learning content possible_" It is also important to stress that currently, mobile technologies such as mobile phones allows for synchronous audio communication with much greater ease and at relative lower cost than online technologies, especially in areas that bandwidth is still a limitation.

The latest developments in mobile technologies e.g. GPRS (General Packet Response Service) that allows for multimedia messaging (MMS = Multimedia Messaging Services), in stead of the well-known short messaging (SMS = Short Messaging Services), makes it possible to deliver and receive multimedia content such as audio, images and video sequences.’ (Brown, 2003)

Both audio and other media content can be loaded on to mobile phones in multiple ways, access to the internet or to a phone service provider are not essential, content can be loaded direct from a PC or from a centralized server “on demand” (which in turn could have downloaded the material via a Bee, for example).

And, phone owner/subscriber direct access to the internet is also increasingly an option for wifi-enabled and 3G handsets (although for the latter download rates through most providers remain very expensive),

‘There is clearly great promise for the use of mobile phones in education in Africa also. As a DE delivery mode, SMS has already proved to be cost-effective and efficient. Visser and West (2005) noted that the next generation of mobile phones “have started to include full Internet access and introduce an ‘always on’ cellular technology which enables the cellular telephone user to access the Internet directly” (p. 120).’ (Motlik, 2008)

A further development from the UK Open University, of more general interest, consists of providing a mobile phone formatted version of its library web pages and content. This may be of interest to both students and teachers. The open source software driving this initiative uses the ADR feature – auto-detect and reformat - which allows the mobile device, be it phone or PDA, etc., to receive a personalized, appropriately formatted copy of each web page in response to receipt of the device specifications which are gathered automatically from it by the library servers.

3. Practice

Obtaining detailed information about the development and use of mobile technologies in context can be challenging, many of the most recent technical or social or implementational developments are not documented formally. Many never will be simply because of the pace of change. In this respect anecdotal evidence from field practitioners and developers has to be deemed relevant. Blogs, in such a context provide pertinent and useful information, for example Subsaharska or Kiwanja postings on cloud storage and why, contrary to perceived wisdom, this remains unrealistic despite fast internet connections (see: <http://subsaharska.maneno.org/eng/articles/rpg1254985742/> and the follow on <http://www.kiwanja.net/blog/2009/11/inappropriate-appropriate-technology/>). But, despite the optimism to be found in small local initiatives and despite an apparent resolution of issues of appropriateness and potential which enable all the technologies previously mentioned to work on the ground under even the most difficult of circumstances, the examples cited above are, by and large, the exceptions. Looking at major donor or government funded projects radio is frequently the most radical broadcast option to survive beyond the initial stages of project planning and design. And, as far as storage and distribution of educational content is concerned cassettes are

still widely used by Open Universities around the world, especially the UK and India, although sourcing cassette players is increasingly problematic.

Why? Examining a few projects in more detail suggests many of them could be interpreted as both successful and not - depending on how one views success. Physical or resource appropriateness are of little importance, social and cultural issues are much more significant.

3.1. PERCEPTION AND VALUES

To a large extent, as Dyer (2001) has pointed out, determining success depends on understanding the world from where the programme recipients are standing, Rabari pastoralists (in India), for example, were more than content with the skills they acquired on the move - from Dyer and a colleague travelling with them for a season - “reading bus destination boards, bus tickets and ration cards” (Dyer, 2001) - but had no interest in continuing learning for a second season because that simply was not what they saw as valuable and worthy of their resources,

‘These [literacy issues] were constructed as a series of discrete problems which if solved would provide independence from others who otherwise had to be requested to perform literacy tasks for them. Rabaris did not regard literacy as a means by which to gain information ... Nomadic pastoralism, as practised by this group, is not amenable to modernisation because it cannot be reduced to issues of productivity and economics: it is a holistic way of life, not simply a mode of production.’ (Dyer, 2001)

Nigeria has experimented widely with educational programming for nomads using “traditional” distance options of radio and television. This has been less than successful and they are now proceeding to implement novel options. The “bottom line” for these programmes is to offer at least functionally useful skills:

One major problems usually faced by Nigeria’s nomads in their wandering activities, is that they lack ‘interactional’ and ‘transactional’ skills with the people they come across during their travels. The acquisition of literacy skills through the mobile learning system will, to a large extent, equip them with valuable interactional and transactional skills needed to enhance their relationships with the people they meet. (Aderinoye et al. 2007)

In this (specific and rural) Nigerian context the suggestion is that wide understanding of, and familiarity with, mobile phones and their daily life value will assist take up and success rates – Aderinoye et al. (2007) note that an advertisement has already set the scene culturally and will promote the mobile learning initiative,

In a recent Mobile Telecommunication Nigeria (MTN) advertisement, a Fulani pastoralist is depicted making a call and telling other Fulani friends that MTN network was now available, even in the remotest regions. This advertisement portrays the fact that pastoralists – like other Nigerians – can also use mobile telephones wherever and for whatever reason. (Aderinoye et al., 2007)

Of course, the case of the Fulani is a very specific geographic and cultural context; the particularities of other contexts will be different although the advert is not the first such, a similar photograph featuring a Samburu (Kenya) tribesman (Weiner Grotta), 2000) appeared more than 10 years ago. However, the principle remains, the form that any

education intervention takes, technology based or not, needs also to be recognized as valid and valuable by the community and culture for which it is proposed. This may be a bigger stumbling block than the introduction of new technology itself. Nomad communities, for example, as lifestyles are fading into a new 21st century socio-economic reality, will have members who have left pastoralism for other sectors of the economy but who will return to visit and report back on urban developments, bringing samples of new technologies, such as the mobile phone, with them. The value of these technologies may be recognized for day-to-day endeavours, using sms for determining market prices for livestock, for example, but this will not necessarily extend to them being used, or perceived as useful for, the delivery of education. There remains the challenge of non-recognition of education happening by mobile delivery when there is no commonly recognized pre-existing model for that happening. Equally, the existence of a *potential* for delivery that way is no substitute.

3.2. EXPECTATIONS AND ASSUMPTIONS

Not unrelated to these questions is the issue of how recipients of these initiatives expect to receive education and how they perceive its ultimate purpose. The Rabari, (Dyer, 2001) for example, like the vast majority of people, still expected education to happen in buildings called schools. The difference for the Rabari being that although they themselves were learning on the move under canvas and acquiring immediately useable skills, they did not expect school to be of much long term benefit.

On a project proposed for nomadic communities in East Africa on which the authors advised recent delivery of, either adapted or new, content via new technology was rejected on the basis that the only curriculum that could be recognized nationally would be that already in place for face-to-face learners. Equally that it would need to be delivered in an identical format to on the move learners in order to be deemed equivalent to that offered in ordinary (i.e. fixed site) primary and secondary schools. It would otherwise run the risk of not being recognized by higher education or by employers. There was no option for an alternative equivalent system despite the long term education needs of the nomadic community being different to those of students not on the move.

The impetus for change will need to come from within and there is abundant evidence in Africa (Sesnan, 2007) that, eschewing distant debates about the digital divide, a new young Google and Facebook generation, more urban but not universally so, has attitudes and a can-do youth culture which favours innovation and inventiveness. Highly motivated to achieve, this is a generation already used to finding what they need on line, wedded to their mobiles and innovating in their own ways. They are from all levels of society, including the unemployed. There is no system to help them and so they make do for themselves. They see no obstacle which cannot be removed or circumvented - it is no coincidence that money transfer by phone, innovative sites like the internationally award winning ushaidi.com - and not a few scams – originated in this generation in Africa.

In this culture the desire to learn will have to be the key. They will, in all senses, appropriate and adapt any of the new technologies, web-based or mobile, as long as they see it fulfilling a need. They have already ensured that pirated music, games, software

and videos are available across the African continent. As was the case with the Rabari, the challenge is to tap into this new culture and provide what they need while recognising that they themselves have great potential to develop the system from their end.

[Look at] ... how important information gets around already. Football results, fashions, new music get around very fast. When Michael Jackson died it seemed everyone knew it in a few hours even in remote parts of Chad. The World Cup result will be known instantly everywhere. ... When looking beyond technology at the flow of information like this what can we learn? It is a system which works by itself. driven by demand. Similarly, when we work in HIV and reproductive health there is always the question of why cigarettes, Omo, beer and Coca Cola are found everywhere but NGOs feel a need to distribute condoms. The need to push indicates that there is not a natural pull. (Barry Sesnan, personal communication, with thanks to ‘Education for nomads’)

It can surely only be a matter of time before a need for information becomes conflated with what could be construed as educational content. At that point how much of that content is then pirated will become an effectiveness indicator for education!

4. Conclusion

Technology for education in developing countries is changing faster than the many systems (Government, management etc.) with which it must associate can themselves change. This means that appropriate technological responses to evolving local needs may occur almost as new needs arise but, ironically, they are unlikely to be adopted until well after technology and need have evolved yet further; attitudes and culture are more significant barriers to the adoption of mobile education delivery technology greater than are technical, resource or sustainability issues. Project success will depend on more than availability of hardware, and will require not only familiarity with any particular devices but also necessitate implementers demonstrating that this is a valid way and means for delivery of education.

Globally, wider technical assessments suggest that a focus on mobile technology rather than on web-mediated solutions is to be advocated,

“It would be a serious disservice to both learners and instructors if Asian and African DE were to cast their lot with Web-based learning. It is an educational medium that is a poor match for all involved. Mobile phone technology is widespread, easy-to-use, and is familiar to both learners and instructors;” (Motlik, 2008)

In short, “appropriate” must centre on fulfilling actual needs and enhance real life

The mobile phone in Africa does something that the OLPC will never do, it integrates itself into the rhythm of life in Africa. Its use flows with the pace of life: it augments one's life experience when it needs to; it plays rescuer when the need arises, it creates incomes where none were possible previously; it makes the world smaller where previously distances were vast. Most importantly, it educates everyone. (Project Diaspora, 2010)

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