Sparking a Digital Revolution:

Digital Educational Tools in Fragile and Emerging Learning Contexts

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Abstract. Digital technology promises to transform the way that we learn, work and play providing new forms of collaboration and cooperation. Over the past twenty years, considerable technological innovations have occurred that are opening up the prospects for education on a worldwide basis. However, for all the progress that has been made, the most fragile members of our societies are being left behind. In this paper, we will explore the issues surrounding fragile learning contexts and propose a human-centered technological model that may spark a more inclusive digital educational revolution.

Keywords: open education, MOOCs, eTextbooks, fragile learning contexts.

1 Introduction

Digital technology promises to transform the way that we learn, work and play providing new forms of collaboration and cooperation [3]. Indeed, the dawn of the Digital Age bore with it promises of education for all, building international networks that would progressively break down the barriers to knowledge, creating new generations of world citizens. Twenty years on, considerable progress has been made but it would legitimate to question whether the potential of digital technology for learning has lived up to these promises. In other areas of society, the progress associated with digital technology is highly significant. For example, the Arab Spring provides poignant examples of the far-reaching impact of the democratization of digital technology. The social interaction around a collaboratively generated objective has led to the creation of a new set of truths that has deeply transformed societies across the world. We are moving towards ubiquitous and pervasive digital technology but the development of associated practices, adapted to learners in fragile and developing contexts is far behind technological innovations. In light of these developments and the potential that digital technologies hold, we can ask ourselves, is it time we sparked an educational revolution? In this paper, we shall explore the barriers to the access to education for all (*Section 2*), explore existing uses of digital educational resources (*Section 3*), examine the models for the stable development of these digital educational resources and discuss avenues for the deployment of these models in context (*Section 4*).

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2 Is education for all a realistic objective?

There are significant barriers to the development of education for all. Whether they be physical, mental or virtual, these hurdles are stifling the development of education in environments where it is needed the most. On the most fundamental of levels, in developing countries, educational infrastructures are struggling to meet the demands of the ever-growing population. Recent studies claim that it would be necessary to build a new world-class university every other day for the next twenty years in order to accommodate the upcoming generation of students that the developing world is generating [15]. The cost associated with such a venture is phenomenal for these countries that are relatively unstable, financially speaking.

Zones of conflict and refugee camps, through their precarious and unstable nature can be considered as the most fragile of learning contexts. The deployment of educational programs in environments where the access to even the most basic of the human necessities for survival is in short supply appears to be somewhat secondary. Yet, as underlined in [13], access to education greatly improves the peace-making process, re-establishing social bonds in view of the end of conflict. Fragile and developing learning contexts are not restricted to the developing world. Within our prisons, millions of people have limited or no access to educational resources. The physical, technical and security constraints of prison environments minimize the potential use of eLearning. Yet education is seen as an effective form of rehabilitation and vocational training strongly facilitates the re-insertion of convicts into society [16].

Questions of accessibility are also at the forefront of issues concerning physically or mentally impaired learners. Whilst the deployment of HTML5 and other such technologies can incorporate increased accessibility for disabled web-users and whilst educators understand the importance of making their content accessible to disabled users, as underlined in [14], many content developers are ignorant of the practices that can be easily implemented to improve access to these resources. In addition to these physical barriers, many virtual barriers persist. For example, censorship can be a major issue when considering access to education, particularly in light of the prominent use of social media in eLearning, services that are often subject to blockage and content deletion [2]. In addition, on a more universal level, users can be affected by questions of accessibility if we consider the interoperability of web technologies.

Faced with these situations, it is important to develop learning resources that can be adapted to the learning context, minimizing, working around or removing the many barriers that are restricting the adoption of digital resources. Several solutions currently exist that could potentially hold the key to the universal adoption of educational resources in view of promoting, in line with Article 18 of the Declaration of Human Rights, access to education for all.

3 Opening opportunities

The first step towards the evolution of education in fragile contexts is the creation and the increased accessibility of Open Educational Resources (OER). Downes

evokes the complexity of the definition, production and sustainability of these resources [6] that are considered as indispensable in paving the way towards education for all [8]. However, OER are yet to have a significant impact in the UNESCO mission to provide universal primary education for 2015. There are several reasons for this, notably the fact that the majority of OER are produced in developed countries and for mainly cultural reasons, they are difficulty translatable into the target context. As indicated in [1], developing countries need to be engaged in the re-use of existing OER and in the production of locally sourced context specific OER. In a similar line of development, context-aware resources are becoming increasingly prevalent digital educational tools, notably for use in ubiquitous learning scenarios [4]. These resources are able to identify a range of characteristics for their users, notably the user profile and the device that they are using and to adapt the content to the particular learning context.

eBooks and more specifically eTextbooks are providing great opportunities for learning in fragile contexts. The potential for eBooks, more specifically those produced following the ePub standard, in fragile contexts is considerable as they require no internet connection and can be easily consulted and shared on a variety of devices. Initiatives such as the World Reader Program are allowing millions of school-age children in developing countries to access a vast catalogue of eBooks via an application installed on GSM phones, devices that are largely available in these environments whilst the campaigning and support of groups such as the DAISY Consortium ensure that these resources are accessible for people with print disabilities. Whilst these resources provide access to high quality educational content, their mainly offline use means it is difficult to integrate the social aspects of learning that are key to sustained learner motivation and that other digital learning objects such as MOOCs can provide.

Massive Open Online Courses (MOOCs) that globally contain forms of social interaction, based upon the content are largely inspired by the philosophy behind OER. McAuley et al. underline this connection when they describe MOOCs as "[integrating] the connectivity of social networking, the facilitation of an acknowledged expert in a field of study, and a collection of freely accessible online resources" [10]. These courses provide learners across the world freely with access to expert knowledge from the world's leading lecturers and researchers. Learners are able to complete their understanding of the subject with the resources provided by the course organizer and evaluate and validate their skills. However, these resources are difficultly re-used in fragile learning contexts as they require significant bandwidth, notably in view of the large proportion of video content. Recent studies of the deployment of MOOCs in refugee camps underline important considerations in adapting this content to this particular environment, replacing video content with podcasts where possible, keeping all activities to a ten minute limit in order to adopt to the learning conditions and to optimize the time spend online and giving clear guidelines and topics for forums in order for learners to maintain their focus and reduce the necessary bandwidth [12, 18].

Indeed, many of these recommendations apply to educational resources on the whole when faced with the singularities of fragile and developing learning contexts. These recommendations take on their full meaning when we take into consideration that mobile phones and devices are the primary distribution content channel in the

developing world. However, this specificity is yet to provoke a considerable shift in the production and deployment of digital content.

4 Sparking a Digital Revolution. Where do we go from here?

The aforementioned tools or mechanisms all show a certain potential for the development of digital education but how can we spark a digital educational revolution that will significantly transform the development of humankind by opening education to the masses? The Hole-in-the-Wall [11] or Granny Cloud [9] experiments provide significant food for thought. These programs are providing thousands of underprivileged Indian youths with access to the resources that they require for undertaking self-organized learning. The impact of these projects is undeniable but we can legitimately raise the question of their replicability, due to the significant financial investments that such projects require.

Ironically, the key to the digital education revolution may reside offline. We have been developing open educational resources in the format of a Massive Open Offline Course, disseminated in the form of a multi-level eTextbook that could be adapted to a variety of learning contexts [5], opening new avenues for human development. The eTextbooks contain four levels (notions, synthesis, deepening and expertise) that correspond to different learning contexts with mechanisms built upon the Vygotskien theory of Zone of Proximal Development (ZPD) [17]. For example, readers can discover the "notions" level independently, work on the "synthesise" level in the presence of an educator or the online community, allowing for a first level of interaction and socio-constructivism, before going onto the "deepen" level to put theory into practice. The working models and associated literature can be found at the following address : http://simontice.wordpress.com/recherche/enriched-courses/

These resources are compact and discrete, weaving their way around virtual and physical barriers where they can be exchanged, enhanced and exported. By adapting, annotating, sharing and re-adapting this content, tutors and learners will be able to engage in a second level of interaction in and around the content that can be transferred from one user to another or even one community of users to another using a simple USB key. As the content is shared it evolves and benefits from the enrichment of the users. It can occasionally be interfaced with a wider online community when or where connections are possible but the majority of the learning and interaction can occur offline in human-driven networks centered upon mobile digital offline devices calling upon both the ZPD and forms of socio-constructivism.

Until now, in the conception of learning objects, educational communities have been misguided by the immediacy of the World World Web and have failed to realize that the immediate nature of online activity and online networks has naturally excluded those who were not able to participate in the conversation. To counteract this, in the second edition of the MOOC ITyPA - Internet Tout y est Pour Apprendre [7] (Everything you need for learning is on the net), we opened the MOOC to partnerships. Ranging from a high school in Kenya, to a group of entrepreneurs in Canada, forty French national and international partners organized workshops and training

events to adapt the contents of the MOOC to the specificities of the local environment, increasing user participation, maintaining the motivation of distant learners and providing multiple channels for access to course content. These actions will be pursued and extended in the the next edition of the MOOC. Indeed, in this way, it is time to place the human back into digital landscape and networks, designing digital initiatives born from user specifications.

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