Chapter 20
Deployment and Adoption Strategy of Cloud Computing for Blended Learning in Higher Education Institutions in Sub–Saharan Africa

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ABSTRACT

Many higher education institutions in sub-Saharan Africa have been blending traditional face-to-face delivery with various Information and Communication Technologies (ICT) to meet the strong demand for higher education as well as to improve the quality of traditional campus programs. Despite the increased adoption of various forms of blended learning in the region, the cost of acquiring and managing ICT infrastructure remained to be the biggest challenge. While cloud computing can provide powerful computing at a fraction of the cost of traditional ICT infrastructure, its potential to enhance blended learning in higher education in sub-Saharan Africa is unexplored. This chapter proposes deployment and adoption strategy of cloud computing to enhance blended learning services in the region. This work contributes towards helping higher education in sub-Saharan Africa to understand cloud services and to make plans for successful migration of computing services into cloud.

INTRODUCTION

Over the past few years there has been a dramatic increase in the use of various Information and Communication Technologies (ICT) in higher education institutions in sub-Saharan Africa. Many institutions are integrating ICT into education as a way to meet the strong demand for higher education – a demand they simply cannot meet with traditional campus programs (Adkins,

2013). Institutions have also been viewing ICT as a solution to cost reduction as well as improving the quality of teaching and learning in the region (Selim, 2007). The cost reduction is described in terms of the costs of classrooms and facilities, training, travel, printed materials, and labor (Bhuasiri, Xaymoungkhoun, Zo, Rho, & Ciganek, 2012).

In light of these benefits, it is not surprising that institutions and international agencies have been spending many thousands of dollars to pilot and implement various eLearning solutions in the region (Farrell & Isaacs, 2007). For example, the African Development Bank Group (AfDB) provided a grant of $15.6 million to African Virtual University (AVU) to build eLearning centers and train content developers at 31 partner institutions in the region (Adkins, 2013). Similarly, the Partnership of Higher Education Africa (PHEA) has given funding to seven institutions in Africa to implement various eLearning solutions (Hoosen & Butcher, 2012).

With these initiatives and many others, the integration of ICT with traditional face-to-face classroom has been increasing significantly in the past few years. According to Adkins (2013), the blended learning in the region has been growing at the rate of 15% per annum between 2011 and 2016. This is also evident from the number of Learning Management Systems (LMS) which have continued to be implemented in higher education in the region. For instance, 80% of higher education institutions in Tanzania were found to have installed various LMS with Moodle being the most popular (Munguatosha, Muyinda, & Lubega, 2011). Similarly, five institutions surveyed by Ssekakubo et al. (2011), six by Lwoga (2012), and seven institutions that participated in PHEA project were found to have installed various LMS (Hoosen & Butcher, 2012).

Similarly, 74 per cent of 447 respondents across 41 African countries said they were using various ICT to support teaching and learning; with 48 per cent using mobile phones, 36 per cent Shared Resource Computing, and 29 per cent

desktop virtualization (Isaacs & Hollow, 2012). Additionally, a recent eLearning Africa conference 2013 report indicates that 83 per cent (out of 413 respondents) from 42 African countries were using laptops, 71 per cent mobile phones, and 67 per cent stand-alone computers to support teaching and learning (Isaacs, Hollow, Akoh, & Harper-Merrett, 2013). The majority of these institutions have been combining various ICT with traditional face-to-face delivery to create the so called "blended learning".

Despite the adoption and penetration blended learning in higher education institutions in the region, several challenges exist. The majority of the challenges faced by these institutions are unique from developed countries (Bhuasiri et al., 2012). For instance, one of the main challenge is the cost of acquiring and maintaining ICT infrastructure to facilitate blended learning delivery (Lwoga, 2012; Ssekakubo et al., 2011; Tedre, Ngumbuke, & Kemppainen, 2010; Unwin et al., 2010). The cost of hardware, software and Internet in the region is still high and unaffordable to the majority of institutions. For example, one institution surveyed by Lwoga (2012) was paying 104 million TShs per year for Internet connection, while another institution surveyed by Tedre et al. (2010) was paying 4 million TShs (2140€ = 3100$) per month for a dedicated 704kb/128kb satellite connection for 300 computers.

In addition to the cost of the Internet connection, the ICT infrastructure is not reliable due to frequent power cuts and shortage of technical staff to provide maintenance to on-campus ICT infrastructure. According to Selim (2007), the success of blended learning depends on the availability of rich and reliable ICT infrastructure capable of providing the courses with the necessary tools to make the delivery process as smooth as possible.

In recognizing these challenges, several initiatives have been underway to overcome these challenges especially improving the Internet connectivity and increasing Internet bandwidth. The most recent initiatives are the three broadband

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