Chapter 13
A Strategy Towards Cost–Effective Content Delivery in the Higher Learning Institutions of Tanzania:
Mobile Learning

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ABSTRACT

The recent development of ubiquitous technologies such as mobile computing facilities in developing countries promises a cost-effective approach for learning in higher learning institutions (HLIs). For instance, in Tanzania, new technologies in HLIs are being blended through eLearning and m-learning. However, HLIs are facing challenges in the delivery of eLearning contents due to the distributed nature of learning environments, the advancement of a large amount of data, shortage in ICT resources, and bandwidth. This study presents the state-of-the-art challenges and opportunities on eLearning in Tanzania. The survey results show that above 75% of students own multiple mobile devices that can support access to M-learning. Then, a cost-effective strategy for content delivery supported by mobile edge computing and cloud computing is proposed. Moreover, it is recommended that HLIs in developing countries should enact ICT policy that integrates issues associated with how to effectively utilize the emerging ubiquitous technologies applicable in their learning environments.

INTRODUCTION

The world is witnessing a rapid evolution in information and communication technologies (ICTs) such as cellular phones and the internet. Cortez (2012) and Randell (2013) report that cellular phone technology advances swiftly providing new capabilities for supporting advancement in data broadcasting, storage, and interactivity. The rate of cellular phone acceptance allowing access to the internet is generally hiking providing opportunities for dependability and convenience of learning contents. Tanzania is among the countries undergoing a growing trend towards subscription of the cellular phone. According to a report by Tanzania Communication Regulatory Authority (TCRA) (2020), the trend of cellular phone subscriptions has increased from 2.96 million in 2005 to 49.21 million in September 2020 causing a rise in penetration rate from 10% in 2005 to 85% in September 2020. On top of that, smartphone adoption has increased from 3% in 2010 to 46% in 2019 thus, projecting a tremendous growth in the coming years (TCRA, 2019). Further TCRA (2020) further explains that Tanzania's internet penetration rate now stands at 46% in September 2020, with the total number of internet users in the country increasing from 23.1 million at the end of 2018 to 27.9 million users by September 2020. There is no doubt that an increase in internet penetration rate has been exacerbated by the increase in the use of smartphones. This has been justified by Statista (2019) which reports that 95% of 23.1 million internet users in Tanzanians accessed the internet via cell phones in 2018. Also, a statement by a technology analyst at Global Data Lorenzo Solazzo (2019), explains that "this smartphone growth is largely driven by increasing 3G and 4G network deployments by mobile operators such as Vodacom and Tigo. For instance, Vodacom added more than 300 4G sites, covering 23% of the population, and added more than 190 3G sites, reaching 52% of the population in 2018".

The Advancement in wireless and mobile technologies is the potential for plummeting the digital gap thus, expanding prospects for education approachability. Electronic learning (eLearning) schemes and mobile learning (m-learning) applications are becoming more popular in Higher Education Institutions (HEIs) providing opportunities for content delivery enhancement and supporting innovative practice in the learning processes (Suhail & Lubega, 2011; Lujara, 2008; Lwoga, 2012; Mtega et al., 2014). These opportunities are in line with the national priorities for exploring the potential of ICT in improving education delivery, outcomes, and impact, as evidenced through the national plans, policies, and strategies (TNIP, 2003; Mshangi, 2013). Similarly, the majority of Institutions of higher learning are increasingly supporting e-learning solution in some ways. Tanzania has a long history in e-learning such that in 2008 there were only two institutions of higher learning utilizing e-learning environments namely; the University of Dar Es Salaam (UDSM) and the Open University of Tanzania (Swarts & Wachira, 2010). Also, in the 2006 Sokoine university of Agriculture adopted free and open-source software (Moodle) for learning (Sanga et al., 2006).

Pinkwart et al. (2003) define eLearning as learning supported by digital "electronic" tools and media while mobile learning (M-learning) is defined as electronic learning that uses mobile devices and wireless transmission. Digital mobility offers a new degree of support and promotion of an expressive learning activity, communal interactivity, and contextual sensitivity. Although there is are some difficulties in using eLearning and m-learning there are more advantages. A study by Atif & Naveed (2010) shows that there are major advantages in using mobile technologies for learning activities which include:

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