

Chapter 19

Ambient Learning Conceptual Framework for Bridging Digital Divide in Higher Education

Simon Nyaga Mwendia
KCA University, Kenya

Peter Waiganjo Wagacha
University of Nairobi, Kenya

Robert Oboko
University of Nairobi, Kenya

ABSTRACT

According to ITU (2012), digital divide is the difference between countries in terms of levels of ICT development. This difference remains significant. In 2011, the ICT Development Index (IDI) value of developed countries (6.52) was twice as high as that of developing countries (3.24). The need to link the digital divide for universal broadband Internet access is within the key international development goals, which include World Summit on the Information Society (WSIS) goals and Millennium Development Goals (MDGs). Ambient learning is the next generation of M-learning (Bick, Kummer, Pawlowski, & Veith, 2007), which allows flexible content access by considering learner's current situation and learning context (Kofod-Petersen, et al., 2008). However, ambient learning has not yet attained a state of common understanding (Winker, Scharf, Hahn, & Herczeg, 2011) and is not widely used or adopted (Bick, et al., 2007). This chapter presents a theoretical conceptual framework to foster creativity for innovative ambient learning applications, which can be used to bridge the digital gap between universities in developed and developing countries.

INTRODUCTION

New information and communication technologies (ICTs) have created a new society known as 'information and knowledge' society. That is, a society that makes decision based on organized

data (information) and makes meaning out of that information (Knowledge). Digital gap between developing countries and developed countries is attributed to ICT development challenges such as limited availability of ICT services in rural areas, Poverty, low literacy levels, unaffordable

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cost of devices and connections. By the end of year 2011, Africa had the lowest ICT development index (IDI) of 1.88, which was below global average of 4.15 (ITU, 2012). Consequently, E-learning systems in higher learning institutions are not readily available, forcing learners to access computers with Internet connectivity only at fixed locations. Such a limitation eliminates flexibility that is required in personalized learning (Muyinda, Lynch, & van der Weide, 2010).

Although developed countries are perceived to have adequate ICT infrastructure, study conducted by B. Kolmel & Kicin (2004), observed that European countries experience barriers of successful uptake and deployment of E-learning systems including lack of time and expertise, inadequate accessibility and usability, failure to incorporate e-learning with the work and life process, fear of mis-investment and inadequate low-quality learning content.

Due to ICT development challenges in developing countries and inadequate accessibility of E-learning systems in developed countries, digital gap in the 'information and knowledge' society has resulted to creation of a certain category of the population that is digitally disadvantaged (digital poor) in both regions. Digital poor groups encounter specific constraints with respect to accessing information and communication that place them on the wrong side of the digital divide. These constraints restrict their participation in the Information Society, thus risking further marginalization, politically, socially and economically (Balit, 2007). Examples of digital disadvantaged groups in universities are; i) University students who have access to mobile phones but with poor access to computers in developing countries like the case of African based universities (90%) (Kashorda & Waema, 2009), who are forced to access computers only at fixed locations with internet connectivity, thus eliminating flexibility that is required in personalized learning (Muyinda et al., 2010a), and ii) University students with health-related impairments in developed countries,

who require additional services to compensate for daily disabilities related disadvantages in higher learning education, like the case of Germany universities (8%) (Unger, Wejwar, & Zaussinger, 2013).

Ambient learning is the next generation of M-learning (Bickl et al., 2007), which allow flexible content access by considering learner's current situation and learning context (Kofod-Petersen, et al. 2008). Relatively little research has been done to focus on the context attribute in M-learning, which is a key attribute in ambient learning. As a result, only few frameworks exist for supporting context-aware M-learning (Thus et al., 2012) and by extension, ambient learning. There is need therefore to establish frameworks for supporting instantiation of applications that adopts ambient learning approach for higher education in 'computer poor' developing countries and in developed countries with disabled students. In order to address this need, this chapter focuses on establishing an appropriate conceptual framework for higher learning education, which aims at bridging digital gap between 'digital poor' and 'digital rich' university students in developing and developed countries.

BACKGROUND

Digital Divide

According to DiMaggio & Hargittai (2001), there are five levels of digital divide. These include: i) Technical resources, which consists software, connectivity quality and hardware (e.g. computers and mobile devices), ii) autonomy of use, which consists access location and freedom of choosing a medium to perform preferred tasks, iii) use patterns, which describes types of Internet uses, iv) social support networks, which describes availability of social network that can help with use of medium and extent of such networks to promote use and, v) skill, which explains one's ability to

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