Chapter 21
Framework to Develop a Learning Analytics System for Smartphone Blended Learning Environment

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ABSTRACT

Smartphones today are ubiquitous and universally influence our everyday life. Now, they are also creating a formidable impact as educational tools. The use of the smartphone specifically for mobile learning has exponentially increased the availability of big data in education. This data can be used for conducting Learning Analytics. Learning Analytics is a powerful tool that supports learners, instructors and institutions in better predicting and understanding a learner's performance and needs. The available tools and techniques used for Learning Analytics' are often not well-defined or well represented. This research proposes a four stage Learning Analytics framework which will aid in defining and understanding all the components of Learning Analytics in a smartphone-based blended learning environment. The proposed framework will be a useful guide for setting up Learning Analytics workflow or can be used to improve an existing system.

INTRODUCTION

In the era of information technology, both students and instructors are increasingly dependent on information and mobile communication technologies. Amongst all the mobile devices, smartphones have evidently outperformed the rest as the most favoured communication devices (Boulos et al., 2011). In a study conducted on assessing the time people spent using smartphones in an average week, it was learnt that they used their smartphones more than 1500 for doing tasks ranging from emails and social media to playing games. A study, conducted to assess the use of smartphones by students, revealed that the

average number of daily texting increased 60 to 100 times a week from 2009 to 2011 (Lenhart, 2012). This study also revealed that the use of smartphones is replacing desktops and laptops.

The use of smartphone is expected to grow rampantly. Global shipments of Smartphones are forecasted to total around 1.43 billion units by the end of 2016 (Weiss, 2015). A report by "Insight" forecast smartphone connections to pass 2 billion units by 2018, mostly lead by the two giant brand names - Apple and Samsung. This explosive growth has been accompanied by significant disruption to the PC and Web-based computing ecosystems.

Smartphones comprise of standard cell phone features such as calling and texting, however the 'smart' features of these devices are those that make them easy to browse the web, play games, check the news, download and install billions of applications that cater to any task imagined, etc. (Boulos et al., 2011). As Smartphone technologies are constantly advancing, it is only a matter of time until these devices are integrated completely into the academic environment (Kuznekoff et al., 2013). It can be comfortably claimed that owning a smartphone is like keeping knowledge & resources at the student's fingertips.

This research is to propose an effective Life Cycle Framework that defines all the components of Learning Analytics (LA) techniques surrounding smartphones. Smartphones offer excellent opportunities for conducting LA, due to the availability of huge amounts of smartphone data about the learners' activities, study patterns, social behaviour, interests, frequency of content access, social networking sites and other online data generation sources. In order to improve learning outcomes (Ferguson et al., 2012) highlight that there is a significant need to understand the complete life cycle of a learning analytics technique and its component's interaction. (Fulantelli et al., 2013) state that as Mobile learning has reached a high level of maturity and the complete understanding of LA techniques can enhance mobile learning experiences.

This research also asserts that a complete understanding can benefit university education, vocational training, formal, non-formal learning environments and lifelong learning scenarios. Furthermore (Aljohani et al., 2012) emphasise that Learning Analytics has not been successful in assisting mobile learners in their need to access contextual learning content; this is due to the limited amount of research carried out in this domain. Consequently, this study proposes to develop a comprehensive life cycle that will combine all the components of a smartphone based learning analytics framework.

The topics in this book chapter are arranged in the following order: Introduction, Research Methodology, Literature Review, Learning Analytics and Conclusions. The section on Learning Analytics is divided into three sub-topics: Development of Smartphone Learning Analytics Framework, the ADDIE Model and the Proposed Smart Learning Analytics Framework (SLAF) Life Cycle.

RESEARCH METHODOLOGY

In this paper, we will discuss what Learning Analytics associated to smartphone is about, and propose an approach that comprises of proceeding successive steps, starting from the learning environment and ending with the appropriate interventions. This Learning Analytics life cycle was developed after gathering information about Learning Analytics taken from the literature review off scientific publications from the last four years. Furthermore, this research also explored at the current available frameworks and reference models claiming popularity in the fields of learning analytics. This motivated us to investigate further, in order to propose an approach that presents a framework as well as a life cycle. We took the

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