Design Principles of Mobile Learning Frameworks

Sofia Moya, Universitat Rovira i Virgili, Spain

https://orcid.org/0000-0001-5397-1765

Mar Camacho, Universitat Rovira i Virgili, Spain

ABSTRACT

Numerous studies show positive cognitive and affective results regarding the adoption of mobile learning; however, adoption levels are low, and when mobile learning occurs, it is not always based on innovative pedagogies. The main objective of this study is to identify and analyse key design principles to develop a model for the adoption of mobile learning in education. This research is based on a systematic review of 20 publications. The findings reveal that most of the current studies focus on the adoption of mobile learning and the design and development of systems and applications. Additionally, these are mostly aimed at educators and instructional designers. Finally, the main dimensions that support the theoretical frameworks are the collaborative, social and communicative, contextual and spatial, pedagogical, technological, and strategic dimensions. Based on these findings, this study presents seven design principles for the adoption of mobile learning.

KEYWORDS

Design Principles, Mobile Learning, Systematic Review, Theoretical Frameworks

INTRODUCTION

The digitalization of the world is unstoppable. Many current jobs will disappear in a period not exceeding 15 years because they demand skills and competencies that differ greatly from those being learned in the classroom (Horn, 2014; Mourshed, Farrell, & Barton, 2013). The educational community faces the challenge of adapting these demands to the labour market, which requires innovative learning strategies (Ada, 2018; Ako-Nai, Tan, & Pivot, 2012; Churchill, King, Webster, & Fox, 2013; Crompton & Burke, 2018a; Sharples & Pea, 2014).

There are numerous mobile learning definitions, and most of them highlight core characteristics and functionalities such as accessibility, ubiquity, interaction, contextualization and personalization (Cochrane, 2010; El-Hussein & Cronje, 2010; Grant, 2019; Koole, 2009; McDonald et al., 2018; Milrad et al., 2013; H Peng et al., 2009; Sharples et al., 2010). These characteristics enhance some of the fundamental learning principles published by the OECD and based on both cognitive, emotional and biological perspectives (Dumont et al., 2010): learners at the centre; the social nature of learning; emotions are integral to learning; recognizing individual differences; stretching all students; assessment for learning; and building horizontal connections (Grant, 2019; A. Herrington et al., 2009; Khaddage et al., 2016; Sharples et al., 2010)The positive cognitive and affective benefits of mobile learning have been demonstrated in numerous studies (Chee et al., 2017; Crompton & Burke, 2018b; Hwang,

2014; Islam & Grönlund, 2016; Liu et al., 2008; Mahdi, 2018; Núñez et al., 2015; Pimmer et al., 2016; Sung et al., 2016; Virtanen et al., 2017; Wu et al., 2012; Zheng et al., 2018).

Despite this, only 14% of European teachers use technology in more than 50% of their classes (TALIS, 2014). In Europe, on average, only 20-25% of students were taught by digitally safe and supportive teachers (European commission, 2013, p. 14). Some authors argue that age is a factor to consider; in general, teachers over 50 are less likely to allow the use of mobile devices in their classes than younger teachers (O'bannon & Thomas, 2014).

Some studies show the lack of current research on frameworks and models used for mobile learning adoption (Alrasheedi & Capretz, 2015; Keengwe, 2007; Keengwe et al., 2008; Miltenoff et al., 2013; Nikolopoulou & Gialamas, 2016; Rikala, 2015; Stevenson et al., 2015; Vahtivuori-Hänninen et al., 2012; Voogt et al., 2013). "The educational community needs a solid theoretical basis for mobile learning and more guidance on how to use technologies and integrate them into their teaching more effectively" (Alsaadat, 2017, p. 15). Some previous studies have been based on the systematic review of the literature or meta-analysis to analyse the main characteristics and trends of mobile learning, such as educational levels, participants, trends in research, mobile learning devices, methodologies used in research purposes or results (Crompton et al., 2019; Fu & Hwang, 2018; Krull & Duart, 2017). Some authors have included other mobile learning frameworks in their literature review (Ada, 2018; Lim Abdullah et al., 2013), but no systematic review of ml frameworks has been found. A review of the academic literature shows the need to develop a theoretical framework for the design of effective models for the adoption and sustainable use of mobile learning in education. Existing models for mobile learning adoption have certain limitations. Most of the mobile learning studies focus on learners and educators (Krull & Duart, 2017; Wu et al., 2012). Fundamentally, the target groups investigated have been students (Mahdi, 2018; Sun & Looi, 2018; Tingir et al., 2017). Strategies that drive significant changes in education are the responsibility of the entire educational community and each one has its role. Mobile learning frameworks have the challenge of evaluating its effectiveness in acquiring and presenting knowledge and there is no consistency in the validity of mobile learning frameworks (Ada, 2018). The present study focuses on covering the preliminary phases of this need. The main objective of this study is to identify and analyse key design principles to develop a model for the adoption and sustainable use of mobile learning in education.

RESEARCH QUESTIONS

The research questions that guide this study to respond to the main objective of identifying and analysing design principles to develop a model for the adoption and sustainable use of mobile learning in education are as follows:

1. What are the most relevant characteristics of the theoretical frameworks used for mobile learning?
2. What are the main design principles used for the development of frameworks for the adoption and sustainable use of mobile learning?

METHODOLOGY

This study is based on the methodology proposed by (Okoli & Schabram, 2010), which is used to structure and organize the systematic review of the literature, and the process is illustrated in Figure 1. The authors themselves define the methodology as "a step-by-step approach to carry out the rigorous and scientific methodology of a systematic literature review" (Okoli & Schabram, 2010, p. 38).

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