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Evolution and use of mobile devices in higher education: A case study in Portuguese Higher Education Institutions between 2009/2010 and 2014/2015

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ABSTRACT

Mobile devices' popularity, particularly tablets and smartphones, has increased over the last years as a result of their versatility and multifunctionality. That consequently led to a wide daily use by everyone and especially among young people. Since 2010 the sales market for mobile devices has not stopped growing. This is justified by the fact that these devices present many advantages, namely usability, portability, versatility, adaptability and an ability to customize individual experiences. In the context of the teaching-learning process, mobile devices allow overcoming the temporal and physical boundaries of the classroom, since information is omnipresent and no longer limited to a specific time and place for learning, particularly the acceptance rate and uses of mobile technologies devices in higher education Portuguese institutions. In order to answering this issue, this paper analyzes the evolution and trends in the use of mobile technologies in higher education institutions in Portugal (North region) between 2009/2010 and 2014/2015.

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1. Introduction

Society is undergoing a radical change in the way we communicate and act, since many sectors of activity are adopting the use of mobile technology to offer services. This change is only possible because the world is becoming more connected and mobile, a trend that will cause a (re)structuring of education.

Mobile technologies, particularly tablets and smartphones, are quickly becoming technologies powerful enough to override personal computers in several tasks with the advancement of wireless and mobile technology. While these technologies have dramatically transformed our society in the way we communicate, create, retrieve and share information, collaborate and socialize each other, the application of these technologies is still relatively recent (West, 2014).

By the end of 2011, there were about 6 billion mobile subscriptions worldwide, and in developing countries most people access the Internet from their mobile devices (ITU, 2012). ITU (2013) shows that the world has almost as many mobile subscriptions as inhabitants. For example, mobile broadband subscriptions grew from 268 million in 2007 to 2.1 billion

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F. Moreira et al./Telematics and Informatics xxx (2016) xxx-xxx

in 2013: an average annual growth rate of 40%. In 2020, digital technology will be incorporated and distributed in most objects. Personal artifacts such as keys, clothes, shoes, books and newspapers will have embedded devices which can communicate with each other (Daanen and Facer, 2007).

In this context, mobile technologies are being used to complete everyday tasks and to learn informally, by accessing the biggest information "library" of the world, the Internet. Thus, students can use mobile technology anywhere and at any time to access educational resources.

Mobile learning has become a research field of interest of practitioners in the different phases of education to facilitate learning in various contexts (Pachler et al., 2010). The key aspects of this interest is the growing importance and their use, in the day-by-day, by students in the most varied activities, and the increasing portability of these technologies, as well as the reduction in their cost and services (Vinu et al., 2011).

Today, mobile devices are all-purpose computing devices, including multi-core processors, high-resolution, touchsensitive, with various sizes and network connectivity (WiFi, 3G, 4G, ...), and have a variety of sensors, such as cameras, accelerometers, etc, which increase their potential for use in education. Significant investments were made to provide infrastructure, content and resources related to the integration of mobile devices in learning environments (Johnson et al., 2011). These mobile devices have become a kind of personal ecosystem (Sharples, 2011).

In developing countries, people have more mobile phones than computers, since they are ignoring the phases of the personal computer and laptop computer and are directly adopting mobile phones as indicated by Leblois (2013), which has provided to the educational agents a unique opportunity to define new teaching-learning processes (TLP) through mobile devices.

Making use of this technology stimulates the interest in learning the taught content, becoming a promoter of learning factor that leading to the training of competent students, open horizons and predisposed to invest in innovation (Baran, 2014; Ross et al., 2010) and encourages their integration in the classroom. Kenney (2011) states that since technology is so present in the daily lives of adolescents, a class without their use is completely uninteresting.

In recent decades, it has been recognized the added value of the use of technological tools in the classroom and, since then, efforts have been made by different stakeholders in the field of education, including the scientific community and governments, towards their use and consequent TLP improvement. Shrivastava and Shrivastava (2014) state that "while the emerging political economy of higher education suggests an increase in the diversity of educational contexts, technology assisted learning could indeed offer an important toolkit with which to increase choice and respond to the needs arising".

Naismith et al. (2004) agree with the argument that mobile devices offer motivating learning experiences, arguing that the devices can be used "dynamically, in many different settings, giving access to a broad range of uses and situated learning activities". The authors state that the personal nature of mobile devices means that they are able to engage students in individualized learning experiences, providing greater ownership and responsibility to the students about their own work.

The advent and use of mobile technologies have led to the emergence of the concept of Bring Your Own Device (BYOD). This concept appeared in 2007, in a business context, as "the practice of allowing employees of an organization to use their own computers, smartphones or other devices for work purposes" (Dictionaries, n.d.). This practice has surpassed the organizational barriers and began to be used widely. According to Akuity (2014), IDC indicates that in 2016 there will be 480 million phones throughout the world and 65% of these devices will be used to BYOD. It is also expected an increase of 181.39 billion dollars in the BYOD market in 2017. Taking into account that this market was worth only 67,210 million in 2011, i.e., it is expected an increase of 200% in six years.

Learning supported by mobile technologies is becoming a new approach towards education, and it is unique in the way that offers opportunities to learn anywhere and anytime (Lee and Salman, 2012; Pachler et al., 2011). On the other hand, collaborative learning has long been believed to hold great value for education, but creating a collaborative learning experience inside and outside of the classroom is a challenge with which teachers continue to struggle, since there are several obstacles e.g. their own preparation for the introduction of this learning approach (DGEEC, 2012). Additionally, there are no consensuses in interpreting collaborative learning; it varies in focus according to the literature (see Section 2.1). However, new educational application – educational apps (Google, n.d.) have, at least in some contexts, begun to transform the way teachers teach, students learn, and teachers and students interact.

The main goal of this study is the evaluation of the adoption and usage trends of mobile devices in the TLP in Higher Education Institutions (HEI) in Portugal (North region) between 2009/2010 and 2014/2015, being an evolution of the work (Ferreira et al., 2015) where more general results have been analyzed and discussed.

In order to achieve the proposed goal was adopted as research methodology a quantitative approach with a fundamentally rationalist basis. Regarding data collection instruments, we used a closed questions survey questionnaire and the necessary statistical procedures, and tools (IBM SPSS Statistics 20.0) to analyze its results (Baran, 2014). This questionnaire entailed a set of closed questions (16 questions), aiming to assess developments and trends of the mobile devices utilization.

The paper is structured as follows. Section 2 critically examines mLearning and collaborative learning. Section 3 presents the state of the art in collaborative learning with mobile devices in Portugal in HEI. Section 4 presents the methodology. Section 5 summarizes the results and discussion of the research and lastly, Section 6 presents the study limitations and 7 presents the study conclusions.

2

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