A review of mobile pervasive learning: Applications and issues

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ABSTRACT

Mobile phones constitute a technology that has become part of our everyday usage. In the absence of an in-depth evaluation of mobile phone appropriation and its utilization, this paper investigates and reviews the usage of mobile phones in the context of pervasive learning. This paper reviews mobile phone usage and associated applications, as well as the negative impact. This paper also covers pervasive computing, and mobile pervasive learning technologies, applications and issues. Fifty-five papers were selected in the review process. The assimilation of pervasive learning with mobile phones marks an incredible venture forward. The incorporation of mobile technology and pervasive learning can enhance the effectiveness and accessibility of learning activities in the future. This new innovation has changed the conventional idea of learning in as much as we are now continually surrounded and submerged in learning encounters.

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1. Introduction

Nowadays everything is becoming more portable. Versatile innovations for communication are increasingly affecting the lives of people. Mobile devices expose people to an incomprehensible wellspring of data and enable communication everywhere (Muthukumaran, Sawani, & Schiffman, 2008; Vetter & Kalakota, 2000). Mobile information and communication technologies have become commonplace in recent years. The evolution of smartphones in particular has allowed users to utilize applications whenever and wherever they want (Dani & Vanishree, 2013; Pascu, White, Beloff, Patoli, & Barker, 2013; Varshney & Vetter, 2002). This has had a huge impact on the way people communicate with each other and their environment, and how they use and exchange information (Chesher, 2007; Walsh, 2009). Technological progress in the form of affordable sensors enables the development of wireless sensor networks, which, combined with the Internet, have led to an increase in the quality of services in a variety of areas including agriculture, transportation, medicine and logistics. Multimedia, mobility and cloud-based services converge to pervasive media (Elgazzar, Ejaz, & Hassanein, 2013; Harrison et al., 2013; Jung et al., 2013; Muaremi, Arnrich, & Tröster, 2013).

The utilization of mobile phones has multiplied exponentially (Cassanelli et al., 2013; Johnson & Trivedi, 2011; Rodrigues, Visvanathan, Murchison, & Brady, 2013). Consequently, it is not surprising that the quantity of mobile phones has dwarfed the number of landline phones in numerous nations. The objective of Zhang, Zhu, and Liu (2012) was to find the general components that impact portable business reception for which the results affirmed that society exerts a particular effect on the consequences in respect of mobile trade selection. Notwithstanding the fact that conventional phones facilitate audio calls, mobile phones provide different functions that permit correspondence and excitement; for example, the prominent Short Message Service, camera phones, MP3 player, Internet, video calling, video games, Multimedia Messaging Service and FM radio (Jokela, Koivumaa, Pirkola, Salminen, & Kantola, 2006; Kaikkonen & Kallio, 2005). Such information and communication technologies coupled with a reasonably priced mobile phone have attracted individuals from different backgrounds, especially the younger generation. Mobile phones are known to be very popular among adolescents. Walsh, White, Cox, and Young (2011) provided evidence concerning the characteristics of youth who become heavily involved with their mobile phones, such as in terms of social indicators and mobile phone usage. The utilization of a mobile phone strengthens connections between people and promotes a belief that all is well, and of security, as they can contact others in times of trouble or crises (Khalil & Abdallah, 2013; Mintz, 2013; Mintz, Branch, March, & Lerman, 2012). In addition, some of the younger generation believe that their status among their associates is

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enhanced if they are seen using an exceptionally innovative mobile phone.

This paper aims to investigate and highlight the usage of mobile phones in the context of pervasive learning in everyday lives. It includes human behavior concerning mobile phone use, pervasive computing and mobile pervasive learning technologies. The method for this research consists of three phases. The first phase was to identify the papers. In this phase, the aim was to find relevant published papers. A number of search strings were constructed based on the research objectives. The search strings were (Mobile OR Wireless Technology) AND (pervasive) AND (computing OR learning OR Application). This search string was used in highly cited and trustworthy resources like the Web of Science, Science Direct and IEEE to retrieve the papers. The second phase was selecting the papers. The initial search results using the above search string was 112 papers. After manually checking the title, abstract, keywords and full paper availability of the paper, the final list was 55 papers. The final phase was to review the paper. This will be discussed in the sections below.

In Section 2, we provide an overview of mobile phone usage and its effects, Section 3 gives an overview of pervasive computing and applications, Section 4 presents mobile pervasive learning techniques, Section 5 presents the main issues concerning mobile pervasive learning, and Section 6 presents the main concluding remarks and future direction for mobile pervasive learning.

2. Mobile phones usage

With its new usefulness, the mobile phone, as a crossover medium, has turned into a vital instrument for mass communication that offers a means for both communication and excitement. Given the high entrance rate of mobile phones and an expanding number of versatile information systems, it is time to rethink the mobile phone as being more than an individual-to-individual portable talking device.

Wei (2008) provided a reasonable understanding of the utilization of the mobile phone for mass interchanges and diversion by focusing on the reasons why individuals utilize the new capacities and who has a tendency to utilize portable information systems. An alternate objective of this study was to produce new experiences and convenient ramifications for remote businesses. The consequences of a phone study of 208 clients showed distinct motivation and anticipation in respect of the assorted uses of mobile phones (Tan, Ooi, Leong, & Lin, 2014). Dynamic thought processes drive the utilization of the mobile phone for looking at news and for surfing the Web. Further, the rationale for sitting back is fundamentally interfaced with playing featured games by means of the mobile phone. Moreover, the cutting edge mobile phones empower clients to be more dynamic: the more seriously that individuals use mobile phones for voice calls, the more probable that they will utilize portable information systems.

A study was conducted to investigate the variables that affect the behavioral intention of consumers to use mobile entertainment in Malaysia (Leong, Ooi, Chong, & Lin, 2013). The findings revealed that perceived usefulness, perceived ease of use, social influence and perceived self-efficacy were positively correlated with consumer intention in using mobile entertainment. The other variables, such as age, gender, marital status, education level, number of mobile phones and experience, were negatively correlated.

Nowadays, information and communication technologies have become essential in human life. These innovations impact the conduct of individuals. Presently, phone and mobile phone information has been utilized to study informal organizations, together with characteristics, for example, sex and age. In addition, the mobile phone information accessible to scientists has been enhanced by topographical data. This permits researchers to dissect the characteristics or even laws that constitute the profoundly unsurprising portability in everyday life. Csáji, Browet, and Traag (2013) explored the relationships between various features of human behavior by using mobile phone big data. The findings show that most people spend most of their time at only a few locations.

2.1. The effect of mobile phone usage

Despite the fact that mobile phone usage brings benefit to many people, studies have shown that the utilization of mobile phones could have an adverse effect on certain settings (Lepp, Barkley, & Karpinski, 2014). For example, learning in classrooms is frequently interrupted when a mobile phone rings at improper times, and mobile phones may introduce hazards when driving. Addiction or dependency on technology is one of negative effects of mobile phone usage, and can lead to other problems, such as emotional stress, damaged relationships and attention deficit disorder. Another negative consequence is a phenomenon called cognitive salience or behavioral salience (Atallah & Yang, 2009; Marinagi, Belsis, & Skourlas, 2013; Yea, Dobson, & McKeever, 2012). This phenomenon indicates how people keep thinking and checking their mobile phone even though they are not using it.

The mobilization of the telephone is more a social methodology, rather than a mechanical procedure. It is clear that mobile phones have gone past their introductory usefulness as a specialized gadget, and, nowadays, have twisted into a status characterizing image of the users. From a social point of view, studies reported different subtleties in the use of the mobile phone (O'Neill et al., 2013; Zhu, Carpenter, & Kulkarni, 2012).

Mobile phones have become prevalent and the conceivable unfriendly impact of such telephones on well-being is of increasing concern. More than one billion individuals use mobile phones around the world, with their numbers rapidly increasing (Törnros & Bolling, 2005). From a health perspective, there is concern about the effect that the increasing use of mobile phones may have on the propensity of brain tumours in users, regardless of the absence of a known organic instrument through which radiofrequency fields from the telephones may cause neoplasms. The presentation from mobile phones is located in the head close to where the handset is held when being used; introduction is generally high just for the glial and meningeal tissue closest to the surface of the head, the parotid organ, and the vestibular part of the eighth cranial nerve where acoustic neuromas emerge (Muthukumaran et al., 2008; Vetter & Kalakota, 2000). Six studies explored the relationship between the utilization of mobile phones and acoustic neuroma, with conflicting results (Chesher, 2007; Dani & Vanishree, 2013; Harrison et al., 2013; Pascu et al., 2013; Varshney & Vetter, 2002; Walsh, 2009). The number of accessible studies is constrained by the lack of research and short time since the introduction of mobile phones.

Longer term use also increases the risk. Van Leeuwen and Lagendijk (1999) studied the human head showing the 3-D temperature gradient incited by a mobile phone. This was carried out numerically with the back-to-back utilization of a FDTD model to examine the electromagnetic force circulation, and a warm model depicting the high bio temperature exchange both by conduction and through the blood stream. In spite of the fact that the transmission of these forces is not in agreement with all the proposed benchmarks for well-being, temperature gradients offer very little in respect of enduring impacts. The motivation behind populace based, case-control studies was to test the theory that extended use of mobile phones increases the risk of brain tumours. Exposure to the radiofrequency from mobile phones is concentrated on the