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# Understanding mobile technology-fit behaviors outside the classroom

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ABSTRACT

An increase in mobile device usage among college students has been documented in different countries. We provide a solid theoretical and empirical foundation for mobile learning in the context of distance education, and more guidance in terms of how to utilize emerging mobile technologies and to integrate them into their teaching more effectively. This research focuses on a deeper understanding of how learners use mobiles as learning tools outside the classroom. Our results are based on a specific population drawn from two different countries, in which the US (United States) population reflected students from the education field, while the students from Israel are drawn more from the engineering and science fields. The findings of this study contribute to the generalizations to the education field and information system designers who need to analyze and design mobile-learning (m-learning) applications to be used outside the classroom.



## 1. Introduction

Nowadays, technology presents new opportunities, which can be utilized in education. Mobile devices are characterized by three important aspects: a) portability: can be taken to different locations, b) instant connectivity: mobile devices can access a variety of information anytime and anywhere, and c) context sensitivity: mobile devices can be used to capture real and simulated data (Churchill, Fox, & King, 2012; Fernández-López, Rodríguez- Fórtiz, Rodríguez-Almendros, & Martínez-Segura, 2013; Kearney, Burden, & Rai, 2015). Mobile devices, like notebook computers, and mobile phones, as learning tools have offered students the flexibility and convenience to acquire knowledge anytime and anywhere. Laptops, tablet computers, pocket PCs with phones, pocket PCs, portable media players and smart phones exist within the mobile devices to offer learning opportunities for the learner (Aguilar-Roca, Williams, & O'Dowd, 2012; Kukulska-Humle & Traxler, 2005; Ravizza, Hambrick, & Fenn, 2014; Tindell & Bohlander, 2012). When leveraging mobile technologies diverse educational environments and various people can be supported (e.g. Um & Kim, 2007).

According to a report in the Bloomberg BusinessWeek in February (2014), almost a billion smart phones shipped globally last year, and the Google Android OS (Operating System) was a big winner, except in the US, where its share fell by about 2 percentage points, while Apple's iOS (iPhone Operating System) gained 6 points. As mobile devices are becoming increasing ubiquitous, many researchers and practitioners have incorporated this technology into their teaching and learning environment. From 2007 to 2011, the Horizon Reports highlight the escalation of the impact of mobile technologies in higher education from a 2–3 year innovation to the current trend. The cell phone and social media tools took center stage between 2007 and 2009, at which point they were overtaken by the wave of handheld touch-screen technologies. The language related to the use of mobile devices as learning tools changed across reports, as well from *cell phone* to *mobile computing* to *mobile technology*. In 2010, the Horizon report hailed mobiles as full of "new surprises", and the report on 2011 is filled with outstanding best practice examples of integrating mobile technologies into classroom activities. It is necessary to dig deep, however, to find evidence that out-of-class learning environment is an integral consideration in learner success.

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By understanding how to improve learning outside the class, we aim to contribute to a trend called ubiquitous learning. The first scholar to define ubiquitous computing was Weiser (1991) who focused on the environment where the computer is integral, but embedded into the background of daily life. In applying this concept to the education field, ubiquitous learning (u-learning) involves learning in an environment where "all students have access to a variety of digital devices and services, including computers connected to the internet and mobile computing devices, whenever and wherever they need them" (van't Hooft, Swan, Cook, & Lin, 2007, p. 6).

A number of studies have reported that many college students own multiple mobile devices, and use them on (Ravizza et al., 2014) and off campus (Caverly, 2012). Dresselhaus and Shrode (2012) examined U.S. college students' mobile usage for academic learning. They found that about 50% of students use mobile devices for a variety of academic tasks, such as reading electronic books, journals, and accessing library catalogs. Cassidy et al. (2011) study showed that about 90% of students use mobile devices to make phone calls and send text messages daily. Although 70% of students said that they download and listen to podcasts for both non-academic and academic learning, many students use them only occasionally. The percentage of Twitter usage was about 20%, which is used mostly for non-academic learning.

An increase in mobile device usage among college students has been documented in different countries. Kobus, Rietveld, and van Ommeren (2013) found that over 95% of Dutch students own at least one mobile device, and students bring hand-held mobile devices to campus, because they are easier to carry around. A study at an Australian university revealed that the three most motivating factors of student's laptop usage for academic learning are "access to information on the web, access to learning resources, and communication with friends" (Kobus et al., 2013, p. 56). Similarly, Boruff and Storie (2014) found that students use mobile devices mostly for information search. Furthermore, mobile devices are often used when learning a second or a foreign language (Mosher, 2013).

A group of researchers in the United Kingdom (UK), meanwhile, observed positive outcomes in the use of mobile devices for English language learners (Ros I Solé, Calic, & Neijmann, 2010). In addition, Dresselhaus and Shrode (2012) found a significant difference in mobile device usage between college students in the sciences and those in the humanities. Their study showed that business and engineering students use mobile devices for schoolwork more frequently than education students. Other research also found that mobile device usage is influenced by different demographic factors, such as age, gender, marital status, and family income (Mazaheri, Mohamed, & Karbasi, 2014). Moreover, Kim, Chun, and Lee (2014) research revealed that college students' smart phone usage is affected by perceived popularity, perceived price, and ethnicity. Further investigation on students' mobile usage behavior in different contexts will help us facilitate mobile learning inside and outside the college campus.

Mobile learning has unique technological attributes which provide positive pedagogical affordances. Above all, mobility enables ubiquitous learning in formal and informal settings by decreasing "the dependence of fixed locations for work and study, and consequently change the way we work and learn" (Peters, 2007, p. 15). A review of the research in the IS area reveals that many studies focus on the use of mobile devices to support learning within the classroom (CDEC, 2009; Cobcroft, 2006; Kukulska-Humle, 2010; Makoe, 2010; Valk, Rashid, & Elder, 2010; Vavoula, Kukulska-Hulme, & Pachler, 2007). Research on learning outside the classroom using mobile technologies seems to be sparse, indicating that there is a gap in the research between learning within and beyond the classroom.

According to a web blog about m-learning (GreenZoner Egypt, 2014), we may see that learning occurs outside the classroom in three ways: a) Teacher-Led – This learning becomes an extension of the classroom. Although the learning takes place outside the classroom, the learning objectives, activities and tools are all teacher-determined and driven by the curriculum. This includes field trips or homework assignments using mobile devices, b) Learner-Led – These learning activities are planned by the learner, who actively seeks out new knowledge and understanding on a topic of interest and c) Spontaneous – This learning occurs during everyday activities. It is informal and unplanned, and flows out from the learners interacting within a given context.

In learning outside the classroom, m-learning can be: formal or informal; planned or unplanned; teacher-directed or learner-directed. M-learning can happen on field trips, in the workplace, or spontaneously while walking in the park. Therefore further examination and research is needed to enlarge the knowledge and opportunity in using mobile devices for academic learning outside class. The paper is structured as follows. Section 2 critically examines previous definitions of m-learning and comes up with a definition that seems best to serve the learning of individual and collaborative m-learning. Section 3 presents the research question and Section 4 presents the methodology. Sections 5 and 6 summarize the results and discussion and lastly, Section 7 presents the study conclusions.

## 2. Background

### 2.1. Definition of mobile learning

Various definitions of mobile learning may be found in the literature, from the technology perspective m-learning is defined as e-learning through mobile computational devices (Quinn, 2000; Trifonova & Ronchetti, 2003). Another definition reflected by the technological perspective is "the point at which mobile computing and e-learning intersect to produce anytime, anywhere learning experience" (Harris, 2001). Meanwhile, an additional learner-centered definition of m-learning has been proposed as "any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that occurs when the learner takes advantage of the learning opportunities offered by mobile technologies" (O'Malley et al., 2003, p. 6).

In our case, we are dealing with students who use mobile devices in their daily lives which in some cases are very busy, involving working in industry and attending lectures. However, having less time is the main issue in their lives, so communicating with classmate on projects, scheduling tasks and updating issues become major issues for the student population in order to succeed in their academic learning. In this research, the academic learning does not characterize specific learning activities. The focus is on learning achievement through university course materials, collaboration, and instruction. In particular, this study relates to the way learning is achieved outside of the classroom, where with the new patterns for learning, we suggest may be different.

Therefore, we introduce an alternative approach to defining m-learning, in which we consider that communication plays a major role in all human activity, including learning. Second, one cannot stop people from being mobile, and hence all learning today is mobile.