On Better Understanding the Usage of Mobile Phones for Learning Purposes

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Abstract—**Mobile devices are omnipresent in one's life leaping developed and developing worlds and leading to interest among researchers on how to use them for learning purposes. This article presents the results of a survey that aims to better understand the use of mobile phones for educational purposes. The results show that 54% of the participants use mobile Internet from their phone the most cited reason being the cost. A total of 30% use their mobile phone for learning purposes and 69% have mobile devices that would allow them to watch video content. The results of people's preferences for specific types of educational media are also presented.**

Index Terms—**Mobile Internet, Mobile Learning, Mobile Phones, Media Usage, Technology-Enhanced Learning.**

I. INTRODUCTION

MOBILE device ownership has increased both in developed and in developing countries, being the fastest growing technology in industry [1]. Increasing ownership and the ability to provide access to educational content "anytime, anywhere" have made them an attractive platform for different services, including education [2]. Previous research has shown mixed findings regarding the usage of mobile devices as a means of facilitating the delivery of learning outcome [3]. Some studies suggest that since a mobile phone is primarily used for entertainment, it is unlikely that people will use them consistently for learning [4], [5]. Faculty resistance to using mobile technology in the classroom is also presented as an impediment [6], [7]. The effectiveness of using mobile devices for educational purposes in terms of learning achievements is still an open question [8]. However, a literature review from 2008-2011 on mobile learning have shown that positive results were reported on improving the learning achievements, student motivation and interest [9].

On the other side, different media types and formats that could be more suitable for mobile learning in an experimental setting have been studied by Macdonald & Chiu [10]. Their results show that video is the preferred multimedia content for mobile devices. As this study has been performed in an experimental setting and there is a lack of research on what media students preferred when using mobile phones for learning purposes in their day to day life. In order to be able to better assess and integrate at a large scale mobile devices in the classroom, an overview of the usage of mobile devices and whether or how they are used for learning purposes in real life rather than in an experimental setting is also important. This study is planning to address this gap by showing the results of a self-disclose usage of mobile devices.

II. SURVEYS EXPLORING THE USE OF MOBILE PHONES IN EDUCATION

Several recent surveys have been performed to assess the state of usage of mobile devices among students [11-14]. Chen & Denoyelles [11] look at the ownership of mobile devices among university students. The results show that the ownership is high and tablets are the most used devices for learning purposes. Johri et al. [12] survey first year engineering students in 2009. The results show that the students use more mobile devices (understood as in previous studies in the broad term, including laptops, tablets etc) than desktop computers. Dahlstrom et al. [13] show that it is common for students to own more than one Internet capable device. The laptop was found to be the most owned device by students followed by the smartphone and desktop computer. The study identifies several barriers that keep the students from using their smartphones as a learning tool, the top five reasons being: low battery life, slow Internet connection, usability issues, cost of Internet connection and limited access to the network. Gidion et al. [14] look into how often students use different devices for studying (including mobile devices) and how satisfied they are with their usage for educational purposes. The study presented below focuses on mobile phones and assesses what media type (i.e. text, image, audio and video) people prefer to use when learning for mobile devices and how people use Internet from mobile phones.

III. RESEARCH STUDY

A. Research Questions

The following questions guided the design of the survey instruction and subsequent data collection:

Research Question 1: Do students use mobile Internet from their mobile phones?

Research Question 2: Do students have a mobile phone that allows them to watch different types of media content?
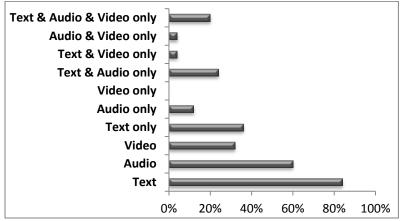
Fig. 1. Preferences towards mobile learning content.

Research Question 3: What kind of media content do students access over the Internet and what is their preferred media content?

Research Question 4: Do students use their own devices for learning?

B. Data collection

A survey was conducted in order to address the research questions. The survey was completed voluntarily and anonymously. The survey was based on a non-probable and convenient sampling. Due to a lack of a sample frame for the population it would have been difficult to reach out a large population using a random approach.

C. Demographics

The survey was administered online and as a result participants from different countries participated in the study. A total of 83 participants fully answered the survey and were considered for the analysis. Their age ranged from 19 to 46, with an average of 26 years old. A total of 41% of the subjects were female and 59% male. Among those 17 were full time students and the rest they were either graduate students or students who were also working. Their job varied (e.g. software developer, pharmacist, sales etc).

D. Findings and Discussions

The results of the survey that were quantitative are presented using descriptive statistics, whereas for the open ended questions a thematic analysis process [15] was used to analyze the responses.

Usage of Internet

The results showed that 54% of the respondents used mobile Internet from their mobile phones. Most cited reason for not using mobile Internet was the cost and lack of transparency in the pricing. Different types of mobile data billing plans have been shown as hard for people to understand especially when they are capped or people pay based on the amount of data they consume [16]. Capped billing plans could either: (a) lead to bandwidth throttling when the data included in the bundle is exceeded or (b) the need to pay more for the data that exceeds the bundle quota [17]. In the first case, the learner, even if s/he uses the mobile data will not be able to access heavy multimedia content (e.g. video) as the bandwidth is limited [18]. In the second case the pricing for the data acquired over the capping could lead to higher than expected bills. It has been shown that in this case, some of the learners preferred to have the video content adapted to a lower quality if this means that they will have more data left in the bundle or they will need to pay less [19]. Moreover this adaptation has been shown to reduce cost [20] and not necessarily affect the learning outcome [21], therefore could be used as a solution for these situations.

Most of the respondents (69%) have devices that would allow them to watch different types of multimedia content including video. However, among those who use the Internet from their mobile devices only 33% use the Internet to watch video online. Participants selected choices are presented in Fig. 1. When the respondents selected only the presented media files they are marked with *only* in the figure. For *text and audio only* show the percentage of the respondents that selected both text and audio as their preferred option but they did not select *video* or *text + image*. When the respondents selected a certain media type as their option but they may have selected also other options *only* is missing in the figure. For example *video* shows the percentage of the respondents who selected video as one of their option but they may have selected also other media types. Based on these results it may be concluded that if mobile devices are to be used for learning purposes, they should allow for both online and offline content. Moreover, consideration should be taken for the users that do not have mobile devices that support this type of content. Otherwise there is the danger of creating two classes of users, those who can afford the technology and mobile Internet cost and those who do not. Therefore personalized content delivery is necessary. These findings are similar to the current trends that show that among mobile users only 30% own a smartphone [22]. Although some of the feature phones will allow playing video content this type of content is mostly accessible through smartphones.

The participants were asked also to select among text, audio and video content, or they could choose other multimedia types, and they were asked to expand upon their choices. They were allowed to choose multiple options. Most users selected one among several options: text (84%), only 36% preferring

video content and none preferring only video content. Text is overall the most preferred multimedia content followed by audio. These results are different from Macdonald & Chiu [10]. However it should be considered that in those studies the participants were in a controlled environment and given devices that support different types of content, including video, while the participants in this survey did not necessarily have access to a device that has video capability. Therefore, the study design might have had an effect over the results.

Usage of Mobile Devices for Learning

Only 30% of the respondents reported using their mobile device for learning purposes. Although data was not collected to why these participants do not use mobile phones for there are various barriers that could have impeded the participants in using them for learning such as the usability issues with mobile devices, not always having Internet connection due to price or network coverage, battery lifetime [13]. As mobile phones are mostly seen as being used in places where the user would not have access to a laptop, tablet desktop or other connection means, intermittent Internet connection and not having the ability to access educational content from them "on the move" could be an impediment. Another reason may be that people usually do not see mobile devices as a learning device but more as a personal device [4].

IV. Concluding Remarks

Despite mobile phones being ubiquitously present in their possessors' lives, there are still open questions on how they can be used for learning purposes. This article added to the understanding of the usage of mobile phones for learning purposes, the barriers to this and preferred media types. The results have shown that 54% of the participants used mobile Internet from their phone and 69% have devices that allow them to access different types of multimedia content including video. This survey has also shown that 30% of the participants use mobile phones for learning purposes. Our findings echo some of the previous studies [13], [22]. For example we found that cost is an issue for using mobile data as Dahlstrom et al. [13] found.

It can be concluded that when designing educational content for learning purposes there is a need to consider that not all the learners have access to the latest mobile phones and not all of them could have access to mobile Internet at any time either due to cost or intermittent connectivity. As a result, the content needs to be adapted not only to the learner profile and the context in which the learner is but also to the device capabilities and user ability to access the content.

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