Ανοικτή Εκπαίδευση: το περιοδικό για την Ανοικτή και εξ Αποστάσεως Εκπαίδευση και την Εκπαιδευτική Τεχνολογία

Τόμ. 15, Αρ. 2 (2019)

Investigating practices and perceptions of higher education students concerning the utilization of mobile devices in their studies

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doi: 10.12681/jode.21990

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Summary

Learning through the use of mobile or portable devices (Mobile Learning or m-learning), is the type of learning that takes place at any time and geographical location and is supported by a device that simulates computer-like functions. Researches about the use of smartphones and tablets in higher education have studied the effectiveness of mobile devices in learning. Other researches have focused on the percentage of students owning and using smartphones and tablets for academic purposes, as well as on problems or barriers recognized by them in the use of mobile devices, during their studies. Although mobile devices play an active role in both daily life and learning process, research data on higher education in Greece, so far, is limited.

Through this research we look forward to enhancing the debate on the use of mobile devices as learning tool and during the educational process in higher education. The present study investigates views of students from the University of Patras on the educational utilization of mobile devices. For this purpose, a questionnaire was created through the GoogleForms online application and was administrated from April to May 2018. This study involved 98 students from various schools, Humanities and Social Sciences (49%), Engineering (19.4%), Economics & Business (15.6%), Natural Sciences (9.2%) and Health Sciences (6.8%).

Regarding the use and availability of mobile devices (smartphones/ tablets), we deduced that almost all students possess a smartphone. It is a fact that we have passed from the era of tablets and laptops to the era of smartphones, bearing in mind that the capabilities of the latter are at least similar to those of tablets and many computers. Regarding the applications most frequently used on their smartphone or tablet to support their studies, students stated that they mainly use PDF reader, email, Facebook, learning management systems such as eclass and google. The above

applications are used for communication purposes, to exchange academic notes and for course information (syllabus, exam topics, notes). Concerning the problems faced by students in the educational utilization of their mobile devices, the majority of them stated that the most important problem is that in many classes there is no wi-fi coverage and even if wi-fi is provided, the speed is very slow, followed by the lack of suitable applications to support learning and teaching. Most students recognize that mobile devices enhance their flexibility about learning, providing more degrees of freedom to them. They mentioned that mobile devices contribute to the way they learn as well as provide liberty about the place and the time they choose to spend on learning. However, almost half of them admit that using mobile devices could cause problems in the educational process, both for tutors as well as for themselves. The main problem in the use of mobile devices for educational purposes for students are their distraction by aimlessly surfing the internet, and for the university tutors, the fact that some of them are unfamiliar with technology, so that they cannot take advantage of it.
Given students' views on how mobile devices contribute to the way they learn, we believe that mobile devices can support distance learning as well. We also consider that mobile applications designers could create environments that mediate the learning process, permitting the mobile usage in class for learning purposes. These environments could restrict the use of various applications (access to specific websites, social media, games, etc.) that seem to distract the student and generally create problems in the educational process. Furthermore, academic staff needs to comprehensively understand the contribution of mobile devices as an innovative tool in the educational process.

Keywords
mobile devices, mobile learning, higher education, smartphones

Introduction

Learning through the use of mobile or portable devices (Mobile Learning or m-learning), is the type of learning that takes place at any time and geographical location and is supported by a device that simulates computer-like functions (Luckinetal., 2005; Crompton & Burke, 2018). Nowadays as mobile devices are mainly identified smartphones and tablets (Chen & deNoyelles, 2013; Hossain & Zabed Ahmed, 2016; Welsh & France, 2011; Nikolopoulou & Kousloglou, 2019; Nikolopoulou, 2019). This portability of digital technologies permits more flexible learning approaches since gives both teachers and students access to multiple sources of information and outside of the classroom where learning is considered genuine and more effective (Nikolopoulou & Kousloglou, 2019; Nikolopoulou, 2019).
A number of studies has been conducted on the use of smartphones and tablets in higher education (Crompton & Burke, 2018; Welsh & France, 2011; Chen & deNoyelles, 2013; Litchfieldetal., 2007; Hossain & ZabedAhmed, 2016; Alzubi & Singh, 2017; Hendersonetal. ; Santos, Bocheco, Habak, 2018; Sevillano-García & Vázquez-Cano, 2015). Researches have studied the effectiveness of mobile devices in learning. Other researches have focused on the percentage of students owning and using smartphones and tablets for academic purposes, as well as on problems or barriers recognized by them in the use of mobile devices, during their studies. For example, in 2012 a study was conducted at the University of Central Florida with the participation of 942 students (809 undergraduate and 133 postgraduate) from 12

different departments with a questionnaire with both closed-ended and open-ended questions. It was found that 91% of the participants had a mobile phone and 37% of them had a tablet. Out of them, only 58% used mobile phones and 82% used tablets for educational purposes (Chen & deNoyelles, 2013). The use of smartphones for academic purposes was also studied by Hossain and Zabed Ahmed (2016) at Dhaka University. This study was focused on 316 students using a smartphone between August and September 2014. The study showed that nearly two-thirds of the respondents used their smartphones as a means of accessing academic information, whereas about one-third of the respondents did not use their smartphone to support their learning needs. Finally, almost 90% of the respondents were interested in downloading applications for academic usage (Hossain & Zabed Ahmed, 2016). A very recent study (2016-2017), conducted by Alzubi and Singh (2017) at the University of Najran, Saudi Arabia, investigated the enhancement of autonomous learning using foreign language learning strategies (English) in collaboration with smart mobile devices. Concerning students' views on the use of smartphones, the findings suggest that some applications could assist in autonomous learning of reading skills, such as the camera, dictionaries, internet use and communication, reading, notes etc. Moreover, the prohibition of smartphone use in the classroom was commented on, as well as their need to be trained on how to use these strategies through smartphones (Alzubi & Singh, 2017). During the academic year 2014, the Australian Education and Teaching Office conducted a survey in a sample of 1658 students from two major universities on the academic use of mobile devices and their usefulness in studies. The results showed that the majority of students had laptops and smartphones, which were used to a great extent for their studies. They also considered these devices to be important throughout their studies, as they could use them to carry out their assignments and to visit educational sites such as Wikipedia, GoogleScholar, and e-learning pages (Hendersonetal., 2015). During the academic year 2015-2016, research was conducted at a Brazilian university with the participation of 176 students and 13 instructors (Santos, Bocheco & Habak, 2018). The results of the research showed that more than half of the students had their mobile phone with them during the courses and many of them used it for academic purposes (sending / receiving emails, using the internet, etc.). Many students also argued that the use of mobile devices in the classroom could support the lesson and that their use should be allowed, however there were opposite opinions, arguing that mobile use should be explicitly banned (Santos et al, 2018). Finally, in 2014 another study examined the acceptance, frequency and use of mobile devices among students of the European Higher Education Area. The research was conducted in a sample of 419 students, from three public universities in Spain (University Complutense of Madrid, the University of Oviedo and National University of Distance Education). The researchers, among other findings, presented factors that determine the use of digital mobile devices in university studies. Furthermore, the majority of students claimed that the use of a mobile device helped them complete a task faster and easier and considered these devices useful for acquiring new skills and abilities related to their studies and for developing learning activities and environment (e.g. E-class Services) (Sevillano-García & Vázquez-Cano, 2015).

Aim and research questions

According to current literature, it has been found that although mobile devices play an active role in both daily life and learning process, research data on higher education in Greece, so far, is limited. Through this research we look forward to enhancing the

debate on the use of mobile devices as learning tool and during the educational process in higher education. The present study investigates views of students from the University of Patras on the educational use of mobile devices, particularly smartphones and tablets. More specifically, we answered the following research questions:
a) To what extent do students' own smartphones and tablets, and in which ways do students use mobile devices in their studies? and
b) To what extent do students think mobile devices contribute to their studies?

Research methodology

Research Tool

Taking into account the aim and the research questions of the research, a questionnaire was developed (see appendix for the research questionnaire), which included closed and open-ended questions, divided into two sections. The first section deals with the demographics of the students surveyed. The second section deals with the availability and utilization of mobile devices. It includes questions on: a) availability of smartphones, tablets and / or any mobile phones, b) frequency of using applications to support their studies, c) interest in downloading another application for academic purposes, which one it would be, what they would do with it and how they would use this application and d) the extent to which some problems were encountered in the educational use of smartphones or tablets.
To investigate the response bias to the questions (A2, A7, A8 and A10, see Appendix), the social desirability tool of Reynolds (1982) was administrated to a sample of 15 students, along with the standard questionnaire and specifically the version with the 11 statements. This tool has been adapted to a Greek student sample and has been confirmed for its validity and reliability (Lavidas and Gialamas, 2019). No significant correlations indicating response biases were observed by this investigation.

Data collection process

The survey questionnaire was created through the GoogleForms online application. The administration of the questionnaire, which lasted from April to May 2018, was implemented by posting the link on various web pages, such as University Department Pages on Facebook groups (Department of Educational Science and Early Childhood Education, Department of Economics, etc.).

Sample

This study involved a total number of 98 students, aged 18 to 24 years. 25.5% were male and 74.5% were female. Most of the students were in their third and fourth year of studies with percentages of 23.5% and 34.7% respectively. Graduate students followed with 15.3%, first-year students with 14.3% and second-year students with 12.2%. Participating students were from School of Humanities and Social Sciences (49%), School of Engineering (19.4%), School of Economics & Business (15.6%), School of Natural Sciences (9.2%) and School of Health Sciences (6.8%).

Results of the survey

The findings we present are based on the descriptive statistical analysis of the responses of the 98 students who answered the questionnaire questions.

Device availability and utilization of mobile applications

According to the respondents' statements (question A.1) almost all (96.9%) own a smartphone, 13.3% have a simple mobile phone and only 38.8% said they have a tablet. Regarding the applications that the students use most frequently through their mobile devices to support their studies (see appendix question A.2), students stated (see Table 1) that they mostly use Google applications often up to very often (91.9 %), Facebook (88.8%), E-class (84.7%), PDF reader (80.6%) and email (76.6%). They also stated that they sometimes use the camera (28.6%) and the calculator (27.6%).

Table 1
Utilization applications of mobile devices (smartphone or tablet) to support student's studies (N = 98)

	Never	Rarely	Sometimes	Often	Often up to Very Often
Google	2,0%	3,1%	3,1%	18,4%	91,8%
Facebook	3,1%	8,2%	0,0%	50,0%	88,8%
Eclass	6,1%	2,0%	7,1%	16,3%	84,7%
PDF reader	7,1%	4,1%	8,2%	21,4%	80,6%
Email	5,1%	5,1%	13,3%	19,4%	76,5%
Youtube	8,2%	27,6%	19,4%	18,4%	44,9%
Calculator	22,4%	13,3%	27,6%	15,3%	36,7%
Camera	21,4%	18,4%	28,6%	21,4%	31,6%
Pinterest	64,3%	12,2%	9,2%	10,2%	14,3%
Moodle	56,1%	12,2%	17,3%	7,1%	14,3%
Skype	61,2%	27,6%	7,1%	3,1%	4,1%

They also stated (see appendix open-ended question A.3) that they use applications such as Microsoft Office (including Word, Excel, etc.), Instagram, SchoolAgenda, etc. Regarding downloading and utilizing another application on their mobile device for academic purposes (see appendix question A.4), only 35.73% of the students answered that they would download any additional application to their mobile device. These applications (see appendix open-ended question A.5) would be mainly related to academical communication among students for sharing notes as well as of attending their studies. Here are some representative answers of the students: *"... an application that informs me in general about my school and studies ..." and "... an application for sharing and organizing notes ..."*

Barriers to the educational utilization of mobile devices (smartphone or tablet)

Regarding the problems that students face in the educational use of their mobile devices (question A.6), half of them answered from Often up to Always to the factor (see Table 2) not free internet connection (45.9%) and that there are no appropriate applications to support learning (44.9%). Answers such as the prohibition of use in

the classroom (35.7%) and unsatisfactory internet bandwidth (28.6%) have lower percentages.

Table 2
Barriers to the educational utilization of mobile devices (smartphone or tablet) (N=98)

	Never	Rarely	Sometimes	Often	Often up to Always
Not free wi-fi internet access	16,3%	19,4%	18,4%	23,5%	45,9%
There are no appropriate applications to support learning	14,3%	17,3%	23,5%	29,6%	44,9%
The use of mobile devices in the classroom is forbidden	20,4%	25,5%	18,4%	18,4%	35,7%
Unsatisfactory internet connection	14,3%	27,6%	29,6%	15,3%	28,6%

Contribution of mobile usage (smartphone or tablet) in the students' studies

The vast majority of students (see appendix question A.7) answered from Agree up to Strongly Agree that mobile devices can contribute to the way students themselves learn (82.7%), at the place where they wish to learn (78.4%) and at the time they choose to spend on learning (73.4%) (see Table 3). In addition, half of them answered from Agree up to Strongly Agree that mobile devices contribute to the way university tutors teaches.

For example, students argued (see appendix open-ended question A.8) that searching for course information and mainly about various assignments and corresponding answers is much easier and faster on a mobile device than in the textbook, that they can also follow the syllabus of the lesson keeping notes as the teacher teaches, as well as they can view any videos and notes of the lessons at anytime and anywhere. Here are some representative answers of the students: *«…you can have the presentation open during the lesson and at the same time you can search for information on the internet, "…permit distance learning for families with low earning ….», «…the student will be able to keep his notes in digital form and to use them whenever he needs them….» and «… At labs and in particular at group assignments mobile devices could help in remote communication and work among students as well as nd between students and university tutors, without the presence of academic staff…»*

Table 3
Contribution of mobile usage (smartphones or tablets) in the students' studies (N=98)

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Agree up to Strongly agree
In the way you learn	1,0%	3,1%	13,3%	64,3%	82,7%

At the place where you learn	3,1%	5,1%	13,3%	46,9%	78,5%
The time to choose to spend on learning	3,1%	5,1%	18,4%	57,1%	73,4%
The way academic staff teach you	3,1%	8,2%	35,7%	40,8%	53,0%

Effects of mobile usage (smartphones or tablets) in the educational process

The majority of students answered (see appendix question A.9) from agree up to strongly agree that using smartphones or tablets could create problems to tutors (41.8%) to themselves (33.6%), to their peers (30,6%) and to the University (28,5%) (see. Table 4). The problems that students indicate (see appendix open ended question A.10) are their distraction by surfing the internet without purpose, as well as that some tutors are unfamiliar with technology so that they cannot take advantage of the technology. Here are some representative answers of the students: *«The only problem that might arise with the use of these devices during the educational process is that students spend their time pointlessly on the internet.…», «…The academic staff might face a problem in case they are not familiar with the use of a smartphone or tablet …», «….improper use of mobile devices by students such as surfing in non-educational sites might result in distraction and annoy the teacher and other students …» and «…I fail to imagine an integrated educational system that maintains a balance between new personalized technologies and the educational process. ….»*

Table 4
Effects of mobile usage (smartphones or tablets) in the educational process (N=98).

	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Agree up to strongly agree
To the academic staff	4,1%	24,5%	29,6%	31,6%	41,8%
To the students	9,2%	29,6%	27,6%	26,5%	33,6%
To your classmates/peers	9,2%	31,6%	28,6%	22,4%	30,6%
To the university	10,2%	32,7%	28,6%	21,4%	28,5%

Discussion of results

The primary objective of this work was to investigate whether students of the University of Patras are using their smartphones or tablets for educational purposes. We also examined their perceptions regarding mobile usage as well as the problems encountered by students in relation to the use of their mobile devices in the classroom. Regarding the use and availability of mobile devices (smartphones/ tablets), we deduced that almost all students possess a smartphone. It is a fact that we have passed from the era of tablets and laptops to the era of smartphones, bearing in mind that the

capabilities of the latter are at least similar to those of tablets and many computers (Chen&deNoyelles, 2013; Sevillano-García&Vázquez-Cano, 2015; Welsh&France, 2011).

Regarding the applications most frequently used on their smartphone or tablet to support their studies, students stated that they mainly use PDF reader, email, Facebook, learning management systems such as eclass and google. The above applications are used for communication purposes, to exchange academic notes and for course information (syllabus, exam topics, notes) (Hendersonetal., 2015; Hossain & Zabed Ahmed, 2016). Living in the age of technology, the Internet and social media, it is expected for students to use the above applications for communication and information search (Lavidas et al., 2020; Parissi et al., 2020; Litchfield et al., 2007). In fact, the daily use of the Google search engine with mobile devices provides solutions to information problems (Lavidas et al., 2020; Lavidas, Komis, Gialamas, 2013; Parissi et al., 2019). Regarding the problems faced by students in the educational utilization of their mobile devices, the majority of them stated that the most important problem is that in many classes there is no wi-fi coverage and even if wi-fi is provided, the speed is very slow, followed by the lack of suitable applications to support learning and teaching (Alzubi & Singh, 2017).

Most students recognize that mobile devices enhance their flexibility about learning, providing more degrees of freedom to them. They mentioned that mobile devices contribute to the way they learn as well as provide liberty about the place and the time they choose to spend on learning (Hendersonetal., 2015; Litchfield et al., 2007; Santos et al., 2018; Sevillano-García & Vázquez-Cano, 2015). However, almost half of them admit that using mobile devices could cause problems in the educational process, both for tutors as well as for themselves (Santos et al., 2018). The main problem in the use of mobile devices for educational purposes for students are their distraction by aimlessly surfing the internet, and for the university tutors, the fact that some of them are unfamiliar with technology, so that they cannot take advantage of it.

Suggestions and limitations

Given students' views on how mobile devices contribute to the way they learn, we believe that mobile devices can support distance learning as well. Students suggested that the utilization of mobile devices by higher education teachers as modern teaching approaches enhance collaboration and interaction (Rotidi et al., 2017). We also consider that mobile applications designers could create environments that mediate the learning process, permitting the mobile usage in class for learning purposes. These environments could restrict the use of various applications (access to specific websites, social media, games, etc.) that seem to distract the student and generally create problems in the educational process (Santos et al., 2018). Furthermore, academic staff needs to comprehensively understand the contribution of mobile devices as an innovative tool in the educational process (Rotidi et al., 2017). In this context, teachers could support and promote the learning of specific mobile applications.

In conclusion, it is worth noting that the sample of the present study is composed of students of the University of Patras and no students from all departments were included. We believe that it is necessary to conduct a large-scale survey of students throughout Greece for the field as well as to investigate the tutors' views and propositions.

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Appendix
Questionnaire of the Research
Demographics
Gender: Male, Female
Age: ……
Year of study: 1st , 2nd , 3rd , 4th , 4th +
School: School of Humanities and Social Sciences, School of Health Sciences, School of Natural Sciences, School of Economics & Business
A) Availability and utilization of Mobile Devices
A.1) Do you have: Smartphone, Tablet, Mobile phone (Multiple answers are accepted)
A.2) How often do you use the following Smartphone or Tablet applications to support your studies?
PDF reader. Facebook, Google, Youtube, E-mail (etc. Gmail), Pinterest, Eclass, Moodle, Skype, calculator, camera
(Answers: Never, Rarely, Sometimes, Often, Always)
A.3) In case you use a not listed above application, please note it here.
A.4) Would you be interested in downloading an additional application for your academic purposes (smartphone or tablet)? (Answers: Yes No)
A.5) If YES, describe what that would be and the way you will use this application.
A.6) To what extent have you encountered or are facing any of the following problems in the use of the smartphone or tablet in the educational process? a)Not free wi-fi internet access, b)there are no appropriate applications to support learning, c)unsatisfactory internet connection and d) the use of mobile devices in the classroom is forbidden.
(Answers: Never, Rarely, Sometimes, Often, Always)
A.7) To what extent do you agree that your own mobile devices (smartphone or tablet) could contribute to your studies according to: a)In the way you learn, b)at the place where you learn, c)the time you choose to spend on learning and d)the way academic staff teach you
(Answers: Strongly disagree, Disagree, Neither disagree nor agree, Agree, Strongly agree)
A.8) Give an example
A.9) To what extent do you agree that the use of smartphones or tablets could cause problems during the educational process?: a)To the academic staff, b)To the students, c)To your classmates/peers and d)To the university.
(Answers: Strongly disagree, Disagree, Neither disagree nor agree, Agree, Strongly agree)
A.10) Give an example