Smartphone Use of University Students: Patterns, Purposes, and Situations

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http://dx.doi.org/10.17220/mojet.2019.02.004

ABSTRACT

Smartphone use is prevalent among university students in and out of instructional settings. This study aimed to describe smartphone use of university students in a developing country, focusing on the purposes, the patterns and the situations of smartphone use. The participants of this study were 842 university students studying in 101 different universities. A cross-sectional survey method was employed in the study. Regarding use patterns, the majority of university students have been using their smartphones for about 3 years, mostly at nights and/or in the evenings, and approximately 5 hours a day. Also, they connect to the Internet about 4 hours via their smartphones a day, and check their smartphones 28 times a day on average. The results indicated that the most frequent smartphone use purpose is texting and talking with someone, followed by checking social media and doing Internet search, while the less frequent purpose is shopping. Smartphones are mostly used by university students to spend free time when bored, alone, and/or waiting for someone. Concerning the implications, the time of sending should be carefully considered before sending course related emails or lecture notes. The most essential or important information, reminder or notification should be sent in the evenings and/or at nights. The messages or course related information should be sent in small chunks. Moreover, the daily routine of the students should be followed in order to benefit from smartphones for learning purposes. As students use their smartphones during lectures, and they will continue using them, effective ways to integrate them into learning must be found.

Keywords: *University students, smartphone, smartphone use, mobile device, mobile device use, information and communication technology*

INTRODUCTION

About 66.8% of individuals in Turkey use Internet (Turkish Statistical Institute, 2017a). The number of mobile cellular phone subscriptions in Turkey is reported as 77.8 million in 2017 (International Telecommunications Union, 2018). Information society statistics indicate that mobile phones or smartphones are present in 97.8% of the houses in Turkey as of April 2016 (Turkish Statistical Institute, 2017b). According to ITU (International Telecommunications Union)'s (2009) report, mobile phones are the most common and widespread personal technology in the world. Parallel with Internet use and mobile phone subscriptions, the number of smartphone users in Turkey is estimated to be 61.34 million in 2022 (Statista, 2016). To be more specific about the device type used, it is reported that desktop accounted for 48.7% of Internet usage worldwide, while mobile devices including tablets exceeds that rate with 51.3% (StatCounter, 2016).

Mobile phones are currently ubiquitous among college students as well (Chen, Seilhamer, Bennett, & Bauer, 2015). Corresponding to the huge penetration rate of smartphone users, now the number of students with mobile devices is more than ever, and smartphone use is common among higher education students

(Dahlstrom & Bichsel, 2014). Moreover, universities gradually embrace on mobile campus, considering how to get benefits and advantages from smartphones for student learning since their potential as a learning tool in higher education is high (Yu, 2012). According to the results of the Campus Computing Project (2015), approximately half (48%) of the campuses in US including public, private universities and colleges, and community colleges seem to be creating their own mobile applications. A variety of mobile devices used by researchers and educators have significantly changed due to the rapid developments in mobile technologies (Hwang & Wu, 2014), and smartphones are being used by more students for learning purposes (Chen et al., 2015).

There are a number of systematic review or meta-analysis studies on mobile learning (Chee, Yahaya, Ibrahim, & Hasan, 2017; Hwang & Wu, 2014; Wu et al., 2012). The results of these reviews revealed that mobile learning is more prevalent in higher education contexts. Based on the results of the aforementioned reviews, mobile learning research outcomes are significantly positive. While mobile phones were found to be the most commonly used devices for mobile learning in educational contexts in the earlier review (Wu et al., 2012), the recent review results reported in common that smartphones were the most frequently used device for mobile learning (Chee et al., 2017; Hwang & Wu, 2014). Despite the widespread smartphone use among university students, much remains uncertain about the educational implications and considerations on how to benefit from these devices for learning purposes. Therefore, the purpose of this study is to describe smartphone use of university students in Turkey and to provide educational implications and considerations.

LITERATURE REVIEW

Mobile Device Use in Higher Education

Mobile device ownership is high among higher education students. The survey results comparing the years 2012 and 2014 indicated that the percentage of smartphone use for learning substantially increased from 58 to 77 percent (Chen et al., 2015). Sheffield University conducted student mobile device survey in 2011. The results revealed that the students at Sheffield University use their smartphones on the campus for surfing the net (88%), social networking (88%), accessing academic services (78%), and e-mailing (69%). When compared to laptop, netbook, tablet/e-reader, and iPod use, smartphones are the most used mobile equipment on the campus. It was also reported that smartphones (87%) are more likely to be used than any other equipment in lectures (The University of Sheffield, 2011). Gikas and Grant (2013) presented students' perspectives on learning with mobile computing devices, including cell phones and smartphones in higher education. The results revealed the advantages of mobile devices for student learning. Mobile computing devices helped students to access information quickly. Constant connectivity provided by mobile devices helped communicate with the classmates and instructor, interact with the course content, and support content collaboration in a situated and contextualized way. Moreover, mobile computing devices allowed students learn in a variety of ways such as recording videos or voice memos, creating virtual history sites, texting messages and e-mails, and reinforcement of the course material through engaging in polls and providing answer to the questions anonymously. These variety of ways encouraged students to communicate and collaborate about course content, and to discuss the course content at length in the class sessions. Although mobile computing devices were considered helpful by the students, the study also revealed student frustrations while learning with the mobile devices. These included anti-technology instructor related issues, device challenges, and distraction caused by the devices.

The Educause Center for Analysis and Research (ECAR) investigated information technology (IT) experiences and expectations of undergraduate students across 45 U.S. states and 15 countries. Based on the results of the ECAR's study of undergraduate students and information technology, with the increased device ownership, smartphones, tablets, and e-readers were used more by students for academic purposes in 2014 than in previous years. For instance, 86% of undergraduate students owned a smartphone while this was 76% in 2013 (Dahlstrom & Bichsel, 2014). The results of Pearson's Student Mobile Device Survey 2015 demonstrated that younger college students tend to use smartphones more. Laptops or smartphones are used by nine in ten college students on a regular basis. Content is downloaded by one in four students every

day on their smartphones so that they can use the content later during the times they do not have an Internet connection. Learning apps on tablets or smartphones are used by the majority of college students (Poll, 2015).

Hossain and Ahmed (2016) investigated current academic use of smartphones by 316 university students in a developing country. All of the respondents accessed the Internet on their smartphones to search for relevant information, and the majority of them (62.3%) used the Internet a few times a day on their smartphones. The respondents stated that they used their smartphones for accessing academic information (65.5%), reading news (63.3%), entering social media sites (60.1%), receiving sports news (40.8%), entertainment (37.9%), and listening to music (37.6%). The academic smartphone use purposes to support learning needs included reading full-text articles (74.9%), viewing learning videos (56.5%), recording class notes (45.4%), preparing class notes (36.2%), and library reference (23.2%). Similarly, Ng, Hassan, Nor, and Malek (2017) examined how Malaysian university students use smartphones for supporting their learning and the relationship between smartphone use and CGPA. Students used smartphones mostly for texting about class assignments, checking reference materials, reading news, solving math problems, and checking course PowerPoint slides. In order to reveal a snapshot of mobile usage today in Turkey, Turkey's mobile consumers in 2016 report surveyed 1000 mobile media users. The results indicated that they have used mobile devices in the 6 months for engaging with a social network (67%), listening to music (67%), using a messaging app (65%), playing a game (65%), and watching short video content (64%). For the academic purposes, they have used them for helping with their school or college work (26%). Mobile app usage has followed the same pattern as well (The Mobile Ecosystem Forum, 2016).

Smartphones offer more affordances to the users due to the fact that their capabilities can be extended through the use of mobile applications. Reese-Bomhold (2013) surveyed 62 undergraduate university students regarding smartphone application use. The frequently used application types expressed by students were social and communication (95.7%), search engines (78.7%), tools and productivity (75%), games or music (65.9%), sports or other entertainment (44.7%), and reference or libraries (36.9%). Little used or not owned application groups were hobbies (44.6%), casual reading (41.3%), finance and banking (40.5%), and shopping (34.1%). When it comes to academic use, 35 students specified 70 applications used for academic purposes as search engines (60%), online encyclopedias or homework websites (14.4%), dictionaries or translators (11.3%), tools (calculators or flashcards) (10%), and libraries or databases (4.3%). In the same way, Jesse (2015) examined smartphone and app usage among college students. The results showed that social media (Twitter, Facebook, Instagram, Pinterest) applications are used by the average college students the most.

Smartphone Use Patterns of University Students

Smartphone use of university students shows different patterns regarding years of use, duration of daily use, daily check frequency, and daily Internet use on smartphones. Deloitte's (2017) study revealed how people aged between 18 and 24, a typical age range for university, use mobiles. Almost half of them check their phones immediately after waking up. Within five minutes of waking up, 30% of them check their phones. More than 70% of them check their phones within half an hour after waking up. Within the group of people aged over 25, only 10% check their phones straight away after waking up, and 20% check within five minutes. In their study, Akıllı and Gezgin (2016) examined the relationship between different behaviour patterns of 683 university students and their nomophobia (fear of no mobile phone) levels. Their results indicated that 39.4% of the participants have been using smartphones for more than 4 years. When participants' daily smartphone checking behaviour was examined, it was found that 34.4% of the participants check their smartphones 49 times or more in a day. When participants' smartphone control behaviour after waking up was examined, it was found that 83.6% of the participants check their smartphones immediately after waking up. Gezgin (2017) explored the impact of the patterns of mobile Internet use on nomophobia levels of 645 university students. He reported that 39.5% of the participants have been using smartphones for more than 4 years, 35.7% of the participants check their smartphones for mobile Internet applications more than 49 times daily, and 37.5% of the participants use mobile Internet for more than 4 hours daily. Gezgin, Şahin, and Yıldırım (2017) investigated nomophobia levels of 1151 social network users according to various factors. Their results showed that 33.9% of the participants have been using smartphones for more than 4 years,

30.8% of the participants check their smartphones more than 49 times a day, and 30.9% of the participants use mobile Internet between 1-2 hours daily.

Smartphone use of individuals, especially young adults and university students in a day, has been the topic of investigation through self-report surveys or empirical studies by many researchers. A study conducted with 269 Taiwanese female university students indicated that the participants' mean of the daily mobile phone use time was 102.61 minutes (*SD* = 159.05), which is 1.71 hours (Hong, Chiu, & Huang, 2012). Oulasvirta, Rattenbury, Ma, and Raita (2012) reported median duration of smartphone use per day as 160 minutes/day (2.67 hours). Lee et al. (2014) analysed smartphone overuse among college students. The mean daily smartphone usage time was 253.0 minutes (*SD* = 90.9) and 207.4 minutes (*SD* = 77.2) for the risk group and non-risk group respectively. Montag et al. (2015) conducted a large-scale investigation of smartphone usage in the 21st century with more emphasis on Whatsapp use in a large sample of 2418 users. Mean daily smartphone usage was found to be 161.95 minutes (*SD* = 83.36), which is approximately 2.70 hours. Haug et al. (2015) investigated smartphone use and smartphone addiction among 1519 young people. It was shown that the majority's smartphone use duration on a typical day was between 3-6 hours (42.8%), and the extreme use was more than 6 hours (8.2%). In their study investigating smartphone addiction among 416 university students, Aljomaa, Qudah, Albursan, Bakhiet, and Abduljabbar (2016) reported that 64.7% of university students use smartphones more than 4 hours in a day. Lopez-Fernandez et al. (2017) researched dependence on mobile phones in young adults through a cross-cultural empirical survey. During an average weekday and weekend, time spent on mobile phones was reported to be around 3 hours. Weekly time spared for mobile phone use was reported to be between 14 and 43 hours.

Purpose of The Study and Research Questions

Several research results demonstrated that the ownership of smartphones is high among university students, and they use their smartphones for a variety of purposes, including personal and academic uses as mentioned earlier. However, available research does not infer enough educational implications and recommendations about how to benefit from these devices for learning purposes. Moreover, in a previous paper, Merchant (2012) mentioned the need to reveal an in depth analysis of mobile practices in everyday and educational settings which inform policy and practice in addition to revealing specific examples focusing on advantages and disadvantages of mobiles instead of debating about prohibiting or encouraging their use. In order to benefit from smartphones and to integrate them into student learning in and out of instructional settings, there is a need to describe routine use of smartphones by university students in detail. Through analysing smartphone use of university students, we can design successful mobile learning opportunities and educational interventions using smartphones which might support students' learning needs. Therefore, this study provides a better understanding of and more insightful results about how university students in Turkey use their smartphones and provides educational implications and considerations.

The aim of this study is to describe smartphone use of university students, especially focusing on "the patterns of smartphone use", "the purposes of smartphone use", and "the situations of smartphone use". Also, this study provides implications and considerations for practitioners who are interested in taking advantage of smartphones for learning purposes. The main research question is answered by this study is: "What are the patterns, purposes and situations of university students' smartphone use in Turkey?".

RESEARCH METHOD

Research Model

In order to describe smartphone-use of university students, a cross-sectional survey method was followed. Survey studies aim to describe the characteristics of a population; however, the population as a whole is rarely studied. Instead of surveying the population, data were collected from a sample. These data can help infer a description of the population (Fraenkel, Wallen, & Hyun, 2011).

Participants

The target population of this study was the university students (both undergraduate and graduate students) in Turkey who have smartphones. The participants of this study were 842 university students studying in 101 different universities. They were 248 (29.5%) males and 594 (70.5%) females. The mean age was 23.26 with a standard deviation of 4.11. Age and gender statistics of the participants are given in Table 1.

Table 1. Age and Gender Distributions

Gender	n	%	Min. Age	Max. Age	Mean	SD
Male	248	29.5	18	39	23.93	4.34
Female	594	70.5	18	45	22.98	3.97

Students were from different grade levels, including preparatory class (n = 11, 1.3%), freshman (n = 93, 11%), sophomore (n = 156, 18.5%), junior (n = 202, 24%), senior (n = 152, 18.1%), and graduate (n = 184, 21.9%). Some participants were from 5th (n = 28, 3.3%) and 6th (n = 16, 1.9%) grade levels since some departments such as medicine have those grade levels in Turkey. Grade levels of the participants are given in Table 2.

Table 2. Grade Level

Level	n	%
Prep Class	11	1.3
1	93	11.0
2	156	18.5
3	202	24.0
4	152	18.1
5	28	3.3
6	16	1.9
Graduate	184	21.9
Total	842	100.0

The CGPA (Cumulative Grade Point Average) of the participants ranged from .70 to 4.00 (M = 2.92, SD = .57). Of 842 participants, 761 (90.4%) of them had Internet package on their smartphones.

Data Collection Tool

The data were collected using a demographics form and a survey instrument which were constructed based on previous literature on smartphone use of university students. The demographic information included participants' age, gender, CGPA, grade level, and Internet package ownership/subscription for their smartphones.

The survey instrument consisted of 3 sections. The first section consisted of 6 items which focused on smartphone use patterns (year of use, Internet package ownership, daily use, daily check, daily Internet use on smartphone, and smartphone use time during the day). The second section consisted of 17 items which focused on purposes of smartphone use. The third section consisted of 14 items which focused on situations of smartphone use. Participants were allowed to choose multiple items in section two and three. Section two and three also included an open-ended "other option".

Collection of Data

The data were collected using a web survey via Google Forms in the fall semester of 2014-2015 academic year. The link of the survey was posted through Facebook. An introductory statement informed participants that the participation was voluntary. The data were exported into a Microsoft Excel document.

After preliminary check, the data were exported into Statistical Package for Social Sciences (SPSS). A total of 931 participants responded to the survey. Data were checked for those who did not meet the inclusion criteria. Those who did not have any type of smartphone (*n* = 63) or those who were not university students in Turkey (*n* = 21) were excluded from the study. Some of the inappropriate responses (*n* = 5) such as using smartphone 24 hours or checking smartphone 1000 times in a day were excluded from the study as well. The data analysis was carried out with remaining 842 participants.

Data Analysis

The data were analysed using descriptive statistics (mean, standard deviation, and percentage). IBM SPSS Version 23 was used for the data analysis.

FINDINGS

Findings are presented according to the research question under three main headings, which are patterns of use, purposes of use, and situations of use.

Patterns of Use

Participants were asked how long they have been using their smartphones (Duration of Use), how many hours they use their smartphones in a day (Daily Use), how many times they check their smartphones in a day (Daily Check), and how many hours they use Internet on their smartphones in a day (Daily Internet Use). Participants' duration of smartphone use varied from 1 to 15 years (*M* = 3.25, *SD* = 2.21). Their daily smartphone use changed from 1 hour to 16 hours in a day (*M* = 4.74, *SD* = 3.33). Daily check frequency was between 1 and 200 (*M* = 28.02, *SD* = 31.04) a day. Daily Internet use ranged from 0 to 16 hours (M = 3.64, SD = 3.02) a day. Patterns of smartphone use of university students are given in Table 3 below.

Table 3. Patterns of Use

Variables	n	M	SD	Min	Max
Duration of Use (*years*)	821	3.25	2.21	1	15
Daily Use *(hours)*	819	4.74	3.33	1	16
Daily Check *(frequency)*	830	28.02	31.04	1	200
Daily Internet Use *(hours)*	793	3.64	3.02	0	16

Moreover, participants were asked when they use their smartphones at most a day. Of the participants, almost 448 students stated that they mostly use their smartphones in the evenings 39% (*n* = 328) and/or at nights 19% (*n* = 160). About 36% (*n* = 307) of the participants stated that they use their smartphones equally throughout the day. Lastly, only 6% (*n* = 52) of the participants mostly use their smartphones in the morning and at midday.

Purpose of Use

Participants were asked for what purposes they use their smartphones. The majority of university students (more than 80%) stated that they use their smartphones for ordinary tasks such as messaging, calling someone, checking their social media accounts, and Internet search. More than half of the participants stated that they use their smartphones for setting alarm, checking time, taking photo/recording video, checking e-mails, listening to music, and checking news. Concerning educational purposes, 47.7% of the participants stated that they use their smartphones to review lecture notes. Less than 50% of the participants stated that they use their smartphones for setting memos, playing games, editing photos, and doing bank transactions. Lastly, 20.3% of the participants use their smartphones for setting meetings or activities, and only 17.8% use their smartphones for shopping (See Table 4).

Table 4. Purposes of Use

Purpose	n	%
Messaging (SMS, WhatsApp, and etc.)	776	92.2
Calling (Phone call, Skype, Viber, and etc.)	734	87.2
Checking social media accounts	695	82.5
Internet search	684	81.2
Setting alarm	655	77.8
Checking time	643	76.4
Taking photo/Recording video	620	73.6
Checking e-mails	587	69.7
Listening to music	549	65.2
Checking news	451	54.6
Reviewing lecture notes	402	47.7
Setting memos	336	39.9
Playing games	333	39.5
Editing photos	331	39.3
Doing bank transactions	287	34.1
Setting meetings or activities	171	20.3
Shopping	150	17.8

In addition to the close-ended answer options, the participants selected the other option. They stated that they use their smartphones to find location through GPS and reading e-books. However, the percentage of these purposes was low.

Situations of Use

Participants were asked in which situations they use their smartphones. More than half of the participants pointed out that they use their smartphones when they get bored, while waiting for someone or something, when they are alone, when they are on public transportation, during lesson breaks, and in leisure times. Less than half of the participants stated that they use their smartphones while hanging out with their friends, during lessons, in restrooms, while watching TV, while walking, while eating, and talking with someone face to face. Lastly, only 5.2% of the participants stated that they use their smartphones while driving (See Table 5.)

Table 5. Situations of Use

Situations	n	%
When get bored	746	88.6
Waiting for someone/something	688	81.7
When alone	674	80.0
On public transportation	634	75.3
During lesson breaks	530	62.9
In leisure times	457	54.3
Hanging out with friends	307	36.5
During lessons	284	33.7
In a restroom	280	33.3
Watching TV	279	33.1
Walking	256	30.4
Eating something	251	29.8
Talking with someone face to face	216	25.7
Driving	44	5.2

In addition to the close-ended answer options, the participants selected the other option as well. They stated that they use their smartphones while lying down to sleep, immediately after they wake up, and while studying. However, the percentage of these situations was low as well.

DISCUSSION AND CONCLUSION

The integration of mobile technologies into educational settings has received noticeable attention worldwide. Therefore, this study attempted to analyse and enhance understanding of smartphone use of university students in Turkey. Important points this study revealed are summarized and discussed below:

- *Texting, calling, checking social media, and Internet search are the most popular ways of smartphone use*! Similar earlier studies (Hossain & Ahmed, 2016; The Mobile Ecosystem Forum, 2016; The University of Sheffield, 2011) also revealed that university students use their smartphones for different purposes, mostly for social media, searching the Internet, and texting. When it comes to normal usage of phones such as phone calls, SMS text messages, and e-mails, people aged between 18 and 24 years old, a typical age range for undergraduate students, are similar to the rest of the population. However, they tend to communicate using social networks on their smartphones, use instant messaging services, use video calls and voice calls via the Internet instead of calling through traditional phone systems, and watch more video (Deloitte, 2017). In addition, social media covers an important part in the lives of people, including university students. Through mobile computing devices and social media, students can interact with content, create content, communicate and collaborate (Gikas & Grant, 2013). It can be said that smartphones are integral tool in the everyday life of the university students with varying purposes to use.
- *University students have been using smartphones for an average of 3.25 years!* It is shown by many studies that a great number of university students own and use smartphones frequently. Smartphones and their applications are generally more likely to be used by younger, educated, and wealthy individuals to a greater extent (Kim, Briley, & Ocepek, 2015). Similar studies have reported that university students have been using their smartphones for a longer period of time, which is more than 4 years for the majority of university students (Akıllı & Gezgin, 2016; Gezgin, 2017; Gezgin et al., 2017). Unlike these results, according to Hossain and Ahmed's (2016) study, the majority of students in a developing country (Bangladesh) have been using smartphones between 6 months to 1 year, only very few of them have been using them for more than 3 years.
- *About half of the university students check their lecture notes through their smartphones!* College students come to class with their smartphones, and they use them for texting messages in class time. Even some of the students use their smartphones during an exam (Tindell & Bohlander, 2012). College students benefit from their mobile devices for self-directed informal learning instead of using them in the formal academic contexts. With a limited amount of guidance provided by instructors, mobile learning typically takes place outside the classroom (Chen & Denoyelles, 2013). However, use of smartphones for instructional purposes is not as widespread as its informal use . The number of mobile devices owned and their actual utilization for academic purposes do not overlap (Chen & Denoyelles, 2013).
- *The average number of checking smartphone is approximately 28 times a day!* Previous studies examining smartphone checking behaviour indirectly also revealed that the majority of university students tend to check their smartphones 49 times or more in a day (Akıllı & Gezgin, 2016; Gezgin, 2017; Gezgin et al., 2017). University students tend to check their phones all the time, even as a first thing when they wake up (Akıllı & Gezgin, 2016). It can be argued that the university students have frequent but short smartphone checking behaviours. Smartphone checking behaviour of university students can be explained by the fact that checking habits

provoke users to do other things via using the device, and this may lead to increase in the usage overall. Also, informational rewards, which are very quickly obtainable after checking the device, reinforce checking behaviors (Oulasvirta et al., 2012). Moreover, the value of the standard deviation of daily check frequency (*SD* = 31.04) indicated that daily check frequency is widely spread around the mean (*M* = 28.02). The reason for this can originate from the nature of the participants as this study included participants from prep class to graduate level, and some of them might be checking their smartphones more frequently than other participants.

- *As for hours of use per day, university students use their smartphones an average of 4.7 hours in a day and connect to the Internet through their smartphones an average of 3.6 hours in a day!* That is, 76.5 % of the smartphone use time is spent for the tasks requiring an Internet connection. While mean of the daily mobile phone use time was 1.71 hours, and median duration of smartphone use per day was reported as 2.67 hours in 2012 (Hong et al., 2012; Oulasvirta et al., 2012), the mean duration was reported to be around 3 hours and more than 4 hours in a day in 2017 (Aljomaa et al., 2016; Lopez-Fernandez et al., 2017). Generally, the studies conducted in the same year provided similar numbers on smartphone use. Based on the statistics reported by previous self-report or empirical smartphone use investigations, daily smartphone use duration follows an increasing trend regardless of the culture, and it is not wrong to say that university students' daily lives are dominated by smartphones (Montag et al., 2015). In terms of daily mobile Internet use on smartphones, studies reported incongruent results. According to Gezgin et al. (2017), most of the students use mobile Internet between 1-2 hours daily while it was more than 4 hours daily as reported by Gezgin (2017).

IMPLICATIONS AND CONSIDERATIONS FOR EDUCATION

Smartphones are more than meets the eye. Smartphones offer more affordances to the users because their capabilities can be extended through downloading different kinds of mobile applications. Smartphones are central to the lives of many university students. Although smartphones and social media do not formally exist in the curriculum, they are used by students for their education. This can be an opportunity since supporting student learning with smartphones can open up a new window for diverse learning approaches for students through designing suitable educational methods, activities, and materials for smartphones (Rung, Warnke, & Mattheos, 2014) so that student learning can be supported cognitively and socially in and out of course times. However, solely having access to a smartphone without the presence of particular directed learning activities can be harmful to the overall learning experience (Tossell, Kortum, Shepard, Rahmati, & Zhong, 2015). To illustrate, the results of Ng et al.'s study (2017) showed negative effects of smartphones on students' academic performance although students used smartphones for school-related learning activities. Therefore, instructional use of smartphones by tertiary students should be better understood and evaluated since as students benefit from their smartphones for learning purposes, they receive information through one-way transmission without the existence of any teaching involved. As educators, we need to find meaningful ways to incorporate these devices into learning. Particularly, we have to find meaningful ways to use smartphones to support and facilitate learning, retention, transfer, and engagement since we cannot ban, and we cannot prohibit the use of smartphones. The following considerations can be recommended:

- While sending course related emails or lecture notes in especially flipped, blended or distance classes, consider "when to send"!
- As students check their smartphones as a first thing in the mornings, the most essential or important information, reminder or notification should be sent in the evenings and/or at nights!
- University students check their smartphones 28 times in a day! As they check it frequently in or out of class, the messages or course related information should be sent in small chunks bit by bit!

- Follow the routine of your students (wake up time, eating time, transportation time, weekly course schedule, etc.) in order to benefit from smartphones for learning purposes as about 75% of university students use their smartphones on public transportation, and they are using their smartphones even in the restrooms!
- About 4 of 10 students use their smartphones during lectures whether we want it or not! As they will continue using them, effective ways to integrate them into learning must be found! For example, a mobile application supporting abovementioned specifications can be designed and developed.

LIMITATIONS AND FUTURE RESEARCH

This study has a number of limitations. The data were collected using a self-report instrument, and relatively small sample from the university student population was surveyed.

Future studies can investigate routine and in-class smartphone and mobile application use patterns of university students, including purpose and place of use empirically in a large student sample in order to look for the ways to benefit from these devices in education.

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