Investigation of University Students' in-Class Smartphones Usage with Association Rules

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Abstract

This study aimed to investigate the university students' usage of smartphones in-class and reveal the relationships among the frequency of use, the purpose of use, reasons for the smartphone using in course, and demographic variables (gender and class). To achieve this aim, we used the correlational survey model. The study sample was selected from the students studying in an Education Faculty of a University in the east of Turkey in the spring semester of 2019-2020 academic year. The sample determined by the snowball sampling method consisted of a total of 577 students. The survey technique was used to collect data. The descriptive and relation analysis were used in the analysis of the data. Frequency and percentage calculations were made for descriptive analysis. For relational analysis, the association rule, one of the data mining methods, was used. It has been revealed that most of the students use their smartphones occasionally and mostly in messages, to do research and connect to social networks. It was observed that the main reasons that motivated students to use their smartphones in the courses were doing research about the course and using them in emergencies. Besides, students gave close answers about the effect of smartphone use on academic performance, and most of the students stated that they did not have difficulty focusing when using smartphones in the courses. Some students also stated that they did not use the phone as it distracted them, and it was forbidden to use it in the course. Results revealed that the boring course, negative attitudes towards the lecturer, and the course cause students to message and connect to social media. It was concluded that the occasional use of smartphones in the courses in cases of emergency and messaging does not affect students' academic performance and does not cause any problems in focusing on the course. Besides, most people who use their smartphones for researching, reading news, and messaging in the courses stated that they use their smartphones for educational purposes. Some suggestions were developed at the end of the study based on the results.

Keywords: Smartphone, Smartphone Usage in-Class, University Student, Data Mining, Association Rules.

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INTRODUCTION

Thanks to the developments in information and communication technologies and the widespread use of these technologies, technological resources have become an indispensable part of our daily life. Therefore, these resources have started to take place in business and school life and people's daily lives. Technological resources affect corporate performance positively due to fast communication, low cost, and comprehensive information access, but employees can sometimes use these resources for personal purposes (Sage, 2015). The use of these resources for personal purposes leads to the emergence of the concept of cyberloafing. Cyberloafing is defined as the use of the internet through any mobile technology for non-business purposes during working hours (Vitak, Crouse, & LaRose, 2011). When considered in terms of educational institutions, this behavior is defined as workplace cyberloafing when it is demonstrated by the manager and teacher and in-class cyberloafing when exhibited by students. However, with the increase in students' access to technological resources during the course, student cyberloafing, which is a newer phenomenon, attracts the attention of researchers. Considering that it is done in a classroom environment and students do not always have access to computers during the course, it can be said that students make cyberloafing most often through smartphones.

Studies with university students revealed that the majority of students use smartphones (Bulduklu & Özer, 2016; Erdem, Türen, & Kalkın, 2017; Yusufoğlu, 2017), and a significant proportion of these students have nomophobia (Tavolacci, Meyrignac, Richard, Dechelotte, & Ladner, 2015; Yıldırım, Sumuer, Adnan, & Yıldırım, 2016a). Nomophobia can emerge as students' behavior to continually look at smartphones, apps, photos, and updates shared on social networks. The use of smartphones widely and addictively by students can give an idea that they will be used during the course when there are no limitations in the classroom. Licoppe (2004) also states that the students want to be always available, so they keep their phones open in the classes. Excessive and uncontrolled use of these technologies by students in the courses causes some unforeseen problems (Brubaker, 2006; Karaoğlan-Yılmaz, Yılmaz, Öztürk, Sezer, & Karademir, 2015; Park, 2005). It is possible to say that university administrations and faculty members have essential responsibilities in combating these unforeseen problems.

The task of educators is to look for ways to improve the learning experience for students. Therefore, it is not surprising that researchers focus on how technological devices that can be in the classroom improve students' pedagogical experience (Baker, Lusk, & Neuhauser, 2012). Baturay and Toker (2015) state that due to the widespread use of technological devices and internet access in school settings, cyberloafing concerns have increased in educational environments. Schools, which realize the effects of smartphones' problematic use, can limit the use of these phones. Some schools prohibit smartphones, as they prevent others, hinder learning during the course, distract attention, and decrease the education quality (Hiscock, 2004; Sánchez-Martínez & Otero, 2009; Selwyn, 2003). Less motivation, boredom, lack of interest in the course, and academic success anxiety cause students to display cyberloafing behaviors (Ergün & Altın, 2012). Besides, individuals with cyberloafing behavior may also experience concentration impairment (Al-Khlaiwi & Meo, 2004). However, not every phone use during the course is considered cyberloafing. Because it is known that the use of smartphones during the course, which the majority of students have access to, has positive effects as well as adverse effects on learning. Therefore, it is essential to reveal the habits of students using smartphones during the course.

This study aimed to reveal the relationships between the university students' purpose and frequency of use of their smartphones during the course and the reasons that push them to use smartphones. In the literature, studies on university students' use of smartphones in the class were examined in the context of cyberloafing (Çınar & Cinisli, 2018; Ergün & Altun, 2012, Kalaycı, 2010; Karaoğlan-Yılmaz, et al., 2015; Knight, 2017; Varol & Yıldırım, 2017; Wu, Mei, & Ugrin, 2018; Yuwanto, 2018), smartphone usage in class (Ağca & Bağcı, 2013; Barkley & Lepp, 2013; Bowman, Levine, Waite, & Gendron, 2010; Denk, 2007), the effects of using smartphone in courses on learning

(Chen & Yan, 2016; Ott, Magnusson, Weilenmann, & af Segerstad, 2018; Lan & Sie, 2010; Naismith, Lonsdale, Vavoula, & Sharples, 2004), academic performance (Gao, Yan, Zhao, Pan, & Mo, 2014; Hawi & Samaha, 2016; Hiscock, 2004; Khan, Malik, & Amin, 2015; Kim et. al., 2019; Koşar, 2018; Lan & Sie, 2010; Lepp, Barkley, Sanders, Rebold, & Gates, 2013, Mwilima & Hangula, 2010; Uğur & Turan, 2015; Yıldırım, Yaşar, & Duru, 2016b), academic motivation (Çok & Kutlu, 2018), and academic concentration (Ezemenaka, 2013). However, there are no studies in the literature examining the hidden relationships between various variables related to smartphones in the courses. In this regard, this study is considered to be important for the literature. It is also hoped that the study results will provide important ideas about the necessity of using students' smartphones in the classroom. In this context, answers to the following questions were sought.

1. What is the frequency of university students' use of smartphones in course, their intended use, and reasons for using smartphones in the course?

2. What are the reasons for students who do not use their smartphones in the courses?

3. What are the relationships between university students' frequency of use of smartphones, their intended use, reasons for using them, their academic performance, their focus on the course, and their demographic characteristics (gender and class?)

METHOD

Research Model

The correlational survey model was used in this study to determine students' in-class smartphone usage. The correlational survey model was one of the general screening models and aimed to determine whether there are a co-variation and level between two or more variables (Fraenkel, Wallen, & Hyun, 2009). A descriptive model of data mining is used to reveal hidden patterns. Data mining may be defined as the process of obtaining valuable information that may be useful and hidden within accumulated or collected data over time (Karabatak & İnce, 2004).

Population and Sample

The study population is 1898 students studying in an Education Faculty of a University in the east of Turkey in the spring semester of the 2019-2020 academic year. The sample of the study was determined from the relevant population using the snowball sampling method. Within the scope of the snowball sample, 13 students were reached first. Later, these students were asked to send the survey to their friends in digital form. When the number of students in the sample was 577 (with 99% confidence and 4.47% acceptable error level), the process of collecting the questionnaire was terminated. Of the students participating in the study, 417 are female students, and 160 are male students. 72 students are first grade, 180 are second grade, 171 are third grade, and 154 are fourth-grade students.

Collection and Analysis of Data

In this study, the survey technique was used to collect data. The researchers prepared survey questions. While preparing these questions, the opinions of two field experts and three university students were asked. The survey's content validity was provided in line with the opinions of the field experts and students, and then the questions were finalized. To determine why students use smartphones in the courses, a survey form consisting of two parts was created.

In the first part of this questionnaire, demographic information was asked to the students. In the second part, "*How often do you use your smartphone in the courses?*", "*What causes you to use a*

smartphone in the courses?", "*For what purposes do you use your smartphone in the courses*?", "*How does using a smartphone affect your academic performance in the courses?*", "*Do you have difficulty focusing on your courses due to the use of smartphones?*" and "*Please specify your reason for not using smartphones in the courses*" questions were asked. The surveys were digitized via Google Forms and delivered to the students via social media groups.

In the current study, descriptive and relational analysis was used to analyze the data. In the descriptive analysis, frequency and percentage calculations were made. On the other hand, in the relational analysis, the relationships between variables were revealed by the association rule, one of the data mining methods. Data mining is a field of study that has been used extensively in recent years to obtain meaningful and useful information from data accumulated in digital environments (Ateş & Karabatak, 2017). The association rule is a technique used to reveal new and useful information from large data sets (Ruiz, Gómez-Romero, Molina-Solana, Campaña, & Martin-Bautista, 2016) and the relationships between the data. The lift and confidence values used in the association rule applications are the two most important parameters of this method (Ateş & Karabatak, 2017). Lift value is an important parameter in the association rule technique, which allows determining the interesting ones, not the many rules (Holsheimer, Kertsen, Manila, & Toivonen, 1995). If the lift criterion takes the value of 1, it is not interesting, but if it takes values greater than or less than 1, it means that the interestingness increases. The confidence parameter refers to the event B's conditional probability value in a rule "A → B". That is the probability that event B will occur if the A event occurs.

FINDINGS

Descriptive and relational analysis findings applied to the data collected within the scope of the study are presented, respectively.

Findings Obtained with Descriptive Analysis

First, a descriptive analysis of the answers given to the survey was made, and the findings are as shown in Table 1.

Table 1. Statistical findings of the questions and answers in the survey form

How often do you use your smartphone in the courses?	N	f	%
Often	577	93	68%
Occasionally		391	16%
Never		93	16%
What causes you to use a smartphone in the courses?	N	f	%
The subject of the course is boring	484	125	26%
Knowing the subject of the course		33	7%
Attitude towards the instructor		124	26%
Attitude towards the course		59	12%
Researching for the course		172	36%
Using in emergencies only		136	28%
Other		6	1%
For what purposes do you use your smartphone in the courses?	N	f	%
For educational purposes	484	182	38%
Reading news		87	18%
Messaging		223	46%
Playing games		44	9%
Watching movies and listening to music		26	5%
Connecting to the social network		171	35%
Shopping		16	3%
Other		9	2%
How does using a smartphone affect your academic performance in the courses?	N	f	%
It has no effect	484	164	34%
It has a positive effect		145	30%

It has a negative effect		175	36%
Do you have difficulty focusing on your courses due to the use of smartphones?	N	f	%
Yes	484	192	40%
No		292	60%

As shown in Table 1, 93 of the students stated that they frequently used, and 93 of them never used while 391 of them occasionally used their smartphones in the courses. 93 students who stated that they never use smartphones in the courses answered why they did not use their smartphones in the courses. The remaining 484 students answered questions about the reasons that led them to use smartphones and their effects. Students stated that they mostly use their smartphones for messaging (n=223), educational purposes (n=182), social networking (n=171), and reading news (n=87). They stated that they use smartphones for playing games (n=44), watching movies and listening to music (n=26), shopping (n=16), and other purposes (n=9), respectively. The most important reason that drives students to use smartphones in the courses is researching (n=172). Using only in emergencies (n=136), boring course subject (n=125), attitude towards the instructor (n=124), attitude towards the course (n=59), knowing the subject of the course (n=33), and other reasons (n=6) followed this. Regarding the effect of students' use of smartphones on academic performance in the courses, it has no impact (n = 164), has a positive impact (n = 145), and has a negative impact (n = 175) options were marked as almost equally. However, some students (n = 292) stated that they did not have difficulty focusing on the course if they used a smartphone during it, while others (n = 192) indicated they had trouble focusing.

Findings regarding the reasons why students do not use smartphones during the courses are as in Table 2.

Table 2. Findings on the reasons for not using a smartphone in classes

Please specify your reason for not using smartphones in the courses?	N	f	%
Distraction	93	61	66%
Prohibited use of the smartphone during the courses		30	32%
Do not have a smartphone		2	2%

As shown in Table 2, the main reason students do not use smartphones in classes is causing distraction (n=61). Prohibited smartphones use during the courses (n = 30) followed this reason. Two students also stated that they do not have a smartphone.

Findings Obtained with Association Rule

We used data mining to examine the relationships among the frequency of students using smartphones in courses, the purposes of using them, reasons for using them, their academic performance, focus on the course, gender, and class grade. The data collected about students' use of smartphones in the courses were analyzed using the association rule. Some meaningful patterns and rules obtained are presented in Table 3.

Table 3. Some meaningful patterns and rules obtaining with the association rule

Rules	Confidence Value	Lift Value
"Emergencies", "No effect on academic performance" → "Using smartphone occasionally"	94.03%	1.16
"Emergencies", "No effect on academic performance" → "There is no problem with focusing"	89.55%	1.48
"Female student", "Emergencies", "No effect on academic performance" → "Using smartphone occasionally"	94.23%	1.17
"Female student", "Messaging", "No effect on academic performance" → "There is no problem with focusing"	86.30%	1.43

Rules	Confidence Value	Lift Value
"Using smartphone occasionally", "Researching for the course", "It has a positive effect on academic performance" → "Educational purpose"	85.07%	2.26
"Using smartphone occasionally", "Researching for the course", "It has a positive effect on academic performance" → "There is no problem with focusing"	86.57%	1.43
"Using smartphone occasionally", "Emergencies", "No effect on academic performance" → "There is no problem with focusing"	88.89%	1.47
"Researching for the course", "Educational purpose", "It has a positive effect on academic performance" → "There is no problem with focusing"	86.75%	1.44
"Researching for the course", "It has a positive effect on academic performance", "There is no problem with focusing" → "Educational purpose"	85.71%	2.28
"Using smartphone occasionally", "Messaging", "No effect on academic performance", "There is no problem with focusing" → "Female student"	85.07%	1.17
"Forth grade", "Researching for the course", "It has a positive effect on academic performance" → "Educational purpose"	86.36%	2.30
"Emergencies", "Messaging", "No effect on academic performance" → "There is no problem with focusing"	93.48%	1.55
"Boring course subject", "Attitude towards the instructor", "Attitude towards the course" → "Messaging"	88.89%	1.93
"Boring course subject", "Attitude towards the course", "Connecting to the social network" → "Attitude towards the instructor"	87.50%	3.67
"Boring course subject", "Attitude towards the course", "Connecting to the social network" → "Messaging"	87.50%	1.90
"Researching for the course", "Reading news", "Messaging" → "Educational purpose"	88.89%	2.36

As seen in Table 3, 94.03% of those who use their smartphones only in emergencies and say that smartphones do not affect academic performance stated that they occasionally use smartphones, and 89.55% stated that smartphones in the courses did not cause focusing problems. According to *rule 3rd*, 94.23% of female students who stated that they use their smartphones only in emergencies and have no effect on academic performance said they occasionally use smartphones. According to 4th *rule 4th*, 86.30% of female students who use their smartphones for messages in courses and say that using smartphones in courses does not affect academic performance said that using smartphones in courses does not cause focusing problems.

According to the *5th and 6th rules*, 85.07% of students, who argued that they use their smartphones occasionally to do research related to the course and that using a smartphone has a positive effect on academic performance, stated that they use their smartphones only for educational purposes, and 86.57% of students indicated that using their smartphone in courses did not cause focusing problems. According to the *7th rule*, 88.89% of the students say that they occasionally use their smartphones only in emergencies and that using them in the courses does not affect academic performance. They stated that using smartphones in courses does not cause focusing problems. According to the *8th rule*, 86.75% of the students who use their smartphones for research and educational purposes in the courses and say that using it in the courses positively affect academic performance stated that using smartphones in the courses does not cause focusing problems.

According to the *9th rule*, 85.71% of the students who use their smartphones for research in the courses stated that the use of smartphones in the courses has a positive effect on academic performance. Furthermore, they said that using smartphones in the courses does not cause focusing problems, and they used their smartphones for educational purposes. According to the *10th rule*, 85.07% of the students who say that they use their smartphones occasionally and for text messaging in courses, using smartphones in courses do not affect academic performance, and do not cause focusing problems, are female students.

According to the *11th rule*, 86.36% of fourth-grade students who use their smartphones for research in courses stated that using smartphones in courses positively affects academic performance and uses smartphones in courses for educational purposes. According to the *12th rule*, 93.48% of the students who argued that they use their smartphones only for messaging in the courses and that using

smartphones in the courses has no effect on academic performance stated that using smartphones in the courses does not cause focusing problems.

According to the *13th rule*, 88.89% of the students who stated that they used smartphones in the courses because of the course's boring subject, the attitude towards the lecturer, and the attitude towards the course said that they used smartphones in the courses. According to the *14th rule*, 87.50% of the students who stated that they used smartphones in the courses because of the course's boring subject and the attitude towards the course, also stated that they used smartphones in the courses due to their attitude towards teaching. This rule has the highest lift value (lift = 3.67); therefore, it can be specified as the most impressive and valuable rule among the rules.

According to the *15th rule*, 87.50% of the students who stated that they used social networks in the courses because of the boring subject of the course, and the attitude towards the course stated that they used their smartphones for messaging purposes. According to *the last rule*, 88.89% of the students who use their smartphones for research, reading the news, and messaging in the courses stated that they use their smartphones for educational purposes. The high lift value of this rule (lift=2.36) also indicates that this rule is interesting.

DISCUSSION AND CONCLUSION

The study aimed to disclose the relationship among the frequency of use, the purpose of use, reasons for the smartphone using in course, and demographic variables (gender and class). The results achieved for this purpose were presented, respectively, and the results were discussed with the results of various studies in the literature. According to the first finding obtained from the study, most of the students use their smartphones occasionally in courses. In the study conducted by Koşar (2018), teacher candidates stated the benefits of their smartphones as follows; taking instant news from family and friends, access and availability in emergencies, communication with faculty members, using as a dictionary and calculator, using reminder feature, being aware of educational activities, access information quickly, learning where and when social activities take place. Çınar and Cinisli (2018) and Karaoğlan-Yılmaz et al. (2015) concluded that the cyberloafing level of university students was at a medium level, and students did not approve of using unnecessary smartphones during the courses. Kim et al. (2019) showed that the students used their smartphones for 21.55 min per 90-min course on average, and session analyses revealed a pattern that the students were distracted every 3–4 min for over a minute with their phones. It is an expected result that university students' smartphones are occasionally used in courses. Because students can use their smartphones for some reasons, such as controlling the clock, using the calculator, using translation and dictionary applications, photographing the board or a slide, or recording the lecturer's presentation in the courses.

According to another finding, the students stated that they use their smartphones in the courses, especially for messaging, research, and connecting to social networks. Kalaycı (2010) pointed out that university students mostly check their e-mails, read news, instant messaging, watch videos, connect to social networks, download music, and attend chat rooms in educational environments. Yıldırım et al. (2016b) concluded that university students mostly use the internet with their mobile devices to enter social media sites and visit news sites. Kim et al. (2019) pointed out that instant messaging programs, social media programs, and web browsers were dominantly used in-class. Knight (2017) and Çınar and Cinisli (2018) revealed that students mostly used instant messaging in the courses. It was mostly pointed out in the literature is that students use their smartphones to messaging and connect to social networks. It can be said that due to the convenience of instant messaging programs and the spread of this habit in society, students continue to messaging in courses.

Students stated that they do not use their smartphones in the courses, noted that the most important reason for this was the distraction of smartphones. The study findings in the literature supported this finding. Ott et al. (2018) and Wu et al. (2018) also found that smartphones are disturbing and distracting in the learning environment. Yıldırım et al. (2016b) emphasized that the

most significant negative factor caused by mobile phones is a distraction in courses. The results can be interpreted as students tend not to use smartphones because they cause distraction.

In this study, the ban on using smartphones in courses emerged as another reason for university students not using their smartphones in courses. However, there are not many study results in the literature showing that the use of smartphones is prohibited in the context of colleges and universities. This is because students in primary, secondary, and high schools are generally at the level of development and that university students are significantly different in the use of smartphones in their educational activities. (Gao et al., 2014). Banning the use of smartphones may not be appropriate for students at the university education level. Because university students consist of young people over 18 years old or adults. This situation may require students to keep their smartphones open, even in courses, due to their ages, responsibilities, and the need to reach and be accessible. In addition to this, unlike primary, secondary, and high school levels, university students may be supported to access information by using smartphones to access the internet in courses. Thus their learning and academic performance can be developed. Çok and Kutlu (2018) also stated that using technology and the internet in educational environments should not always be considered as unnecessary smartphone use. Because some teachers allow students to gather information, create groups and forums, review blogs and discussion lists, and research using the internet in courses. Jackson (2012) stated that the mobile devices capable of accessing the internet have become ubiquitous, and these devices are creating both challenges for educators and opportunities for students.

The aspect that makes this study different and essential from other studies on the use of smartphones in the course in the literature is that some hidden rules among variables revealed by the data mining techniques. The rules also revealed the relationships among the frequency of use, the reasons for using the smartphone, and the purpose of using a smartphone in the course. As a result of the descriptive findings, the students' main reasons for using smartphones are researching and using only in emergencies. However, the boring subject of the course, attitude towards the instructor, attitude towards the course, and knowing the subject were also found as other reasons that motivated the students to use smartphones in the courses. As a result of the relational findings obtained with the association rule, it was revealed that when students feel that the course is boring and improve the negative attitudes towards the course and the instructor, the students are messaging and connecting to social media. This result is one of the most important results of this study. It coincides with the results of the studies in the literature. Ergün and Altun (2012) revealed that lack of motivation, attitude towards the instructor, the course's monotony, lack of classroom rules, boring subject of the course, belief that the course content is not useful, and duration of the course enabled students to make cyberloafing. Yuwanto (2018) stated that cyberloafing in the courses results from students' intrinsic motivation, ability to focus or concentrate on activity and affect or comfort when doing the exercise. Varol and Yıldırım (2018) stated that cyberloafing that students made were a negative attitude towards the instructor, insufficient class management skills and field knowledge of the instructor, monotonous course, negative attitude towards the course, distraction, and lack of motivation. Kim et al. (2019) stated that predictors of in-class usage were daily usage behaviors, class size, and lecture organization. We can say that an essential reason for students to use their smartphones in the class unrelated to the course subject and especially to messaging and connect to social networks is their negative attitude towards an element of the classroom environment. It can be thought that students who develop negative attitudes tend to another area of interest to avoid this negativity.

According to the descriptive findings of the effect of using smartphones on academic performance in the courses, the rates of opinions stating that smartphones have adverse effects, no effects, and positive effects on academic performance are almost the same. However, most of the students stated that they did not have difficulty focusing when they use smartphones in the courses. In relational findings, while generating rules about the fact that smartphones have a positive effect and have no effect on academic performance, no rules have been produced regarding the negative effect on academic performance. This is because university students express their opinions that they use smartphones, especially for educational purposes. According to the relational finding, the occasional

use of smartphones only in emergencies and messaging does not affect students' academic performance and does not cause any problems in focusing on the course. Besides, most of the students who use their smartphones for researching, reading news, and messaging use also their smartphones for educational purposes.

In another rule, it was revealed that senior university students who stated that smartphones had a positive effect on their academic performance used their smartphones to research the course. But this result different from the results of Baturay and Toker (2015) and Arabacı (2017). Because, in both studies, upper-grade students had more cyberloafing actions than lower grade students. This rule can be explained by the fact that students studying in the senior students are more conscious, show more effort to graduate, and anxiety of appointment after graduation.

The studies in the literature revealed that the use of smartphones in the courses have positive effects (Bowman et al., 2010; Chen & Yan, 2016; Hawi & Samaha, 2016; Kim et al., 2019; Khan et al., 2015; Koşar, 2018; Lan & Sie, 2010; Naismith et al., 2004; Ott et al., 2018), have negative effects (Barkley & Lepp, 2013; Kim et al., 2019; Koşar, 2018; Lepp et al., 2013; Ott et al., 2018; Uğur & Turan, 2015; Wu et al., 2018; Yıldırım et al., 2016b) and has no effect on academic performance (Ezemenaka, 2013; Kalaycı, 2010). In the study of Khan et al. (2015), students stated that mobile phones helped improve their academic performance and the quality of education, while some students considered the use of mobile phones as a waste of time. Lan and Sie (2010) and Ott et al. (2018) revealed that smartphones are effective teaching and learning tools. Koşar (2018) observed that smartphones in the courses provided immediate learning and had positive contributions to education. In the study of Bowman et al. (2010), students' use of instant messaging in courses was not effective in their academic performance, but they actually need more time to achieve the same level of performance on an academic task. Kalaycı (2010) also claimed that if a student is successful in any course, cyberloafing in the related course will not affect its success. The study by Kim et al. (2019) was revealed that frequent usage of instant messaging and web browsers was positively associated with grades, although the usage duration of those apps had a negative association. But researchers commented that when students can self-regulate smartphone use well in classrooms, brief and frequent smartphone use may positively affect learning or refreshing attention. Denk (2007) and Naismith et al. (2004) claimed that mobile technologies could enhance the implementation of a wide range of educational theories, such as behaviorist, constructivist, situated, collaborative, life-long learning. Chen and Yan (2016) and Hawi and Samaha (2016) stated that smartphones might enhance the efficiency of students' study activities by allowing them to search for study-related information continuously and by facilitating teamwork.

Gao et al. (2014) also showed that smartphones affect students' academic performance negatively, allow cheating in exams and cause various psychological discomfort. As a result of the studies carried out by Wu et al. (2018) and Ravizza, Uitvlugt, and Fenn (2017), it was revealed that there was an inverse relationship between the use of technological tools such as telephones and computers in the classroom and academic performance. Kim et al. (2019) showed that phone usage in-class negatively affected student grades. Hembrooke and Gay (2003) found that students who listened to the same instructor but was allowed to use digital devices had poorer scores on memory tests than students who were not allowed to use their computers. Instead of waiting to be helped by the teacher in the courses, students can use technology to access additional information (Ragan, Jennings, Massey, & Doolittle, 2014). Because smartphones provide many benefits to learners during the course thanks to their portability, accessibility and, connectivity advantages (Ağca & Bağcı, 2013). In this respect, mobile devices in the courses help learners' access information quickly and effectively (Koşar, 2018). However, the internet also plays a serious role in removing students from the learning process (Brubaker, 2006). Therefore, easy access to the internet via smartphones can be a distraction in the courses. However, the smartphones will not cause any focusing problems in the courses by providing on-site and timely use by the students or providing effective and efficient use by the instructor. For this reason, it can be said that by using it properly, smartphones will have a positive effect on

academic performance. But as Baker et al. (2012) pointed out before, when it comes to the use of mobile phones in courses, research concerning the learning pros and cons is still inconclusive.

Koşar (2018) found that using the phone in courses can speed up learning, record information, share the lecture notes, but cause a drop in academic achievement due to distraction. Barkley and Lepp (2013) and Lepp et al. (2013) concluded that students see their smartphones as a source of entertainment, not as a means of research. Using smartphones in the course may cause a decrease in academic success. Uğur and Turan (2015) concluded that mobile applications were used only to spend time. Yılmaz et al. (2015) was revealed that students' tendency towards cyberloafing behaviors increased due to internet access and widespread in schools. They stated that the increase in this tendency would create obstacles and distract students' motivation and performance.

SUGGESTIONS

Since it is not possible to completely prevent smartphones in courses, smartphones should be taken under control. In the courses where the use of smartphones is not required, instructors can take the measures such as exposing the class rules, making the course more attractive, giving students responsibility, ensuring the importance of the course is understood by the students, improving students' time management skills and taking a break from time to time by taking part in individual activities. Besides, the following suggestions were offered to prevent university students from using irrelevant smartphones during courses:

- Students may use their smartphones when they are bored with the course or when something is in mind. Instructors can arouse their curiosity with examples from current life to motivate students and increase their attention. They should also identify teaching strategies in which they can use visuals or short videos in courses.

- Prohibition or restriction may be imposed on placing phones in the middle and high school level. However, limiting these devices at the university level will not be easy due to many factors. For this reason, instructors can use awards to appreciate and encourage students to avoid using the phone unrelated to the course.

- Students should be informed that smartphones have distracting features and that using these devices to messaging and connect to social networks has the potential to distract not only their attention but also their classmates.

- Instructors should make use of their field knowledge to make students feel that there is new information that each student will learn from the course to be taught, ensure that students participate in the course, and keep them active in the course.

- Instructors should develop special learning-teaching activities related to the use of smartphones in the course and ensure that these devices are used for research and support education but not irrelevant to the course.

REFERENCES

Ağca, R. K., & Bağcı, H. (2013). Eğitimde mobil araçların kullanımına ilişkin öğrenci görüşleri. *Eğitim ve Öğretim Araştırmaları Dergisi, 2*(4), 295-302.

Al-Khlaiwi, T., & Meo, S. A. (2004). Association of mobile phone radiation with fatigue, headache, dizziness, tension and sleep disturbance in Saudi population. *Saudi Medical Journal*, *25*, 732-736.

Arabacı, İ. B. (2017). Investigation faculty of education students' cyberloafing behaviors in terms of various variables. *The Turkish Online Journal of Educaitonal Technology, 16*(1), 72-82.

Ateş, Y., & Karabatak, M. (2017). Nicel birliktelik kuralları için çoklu minimum destek değeri. *Fırat Üniversitesi Mühendislik Bilimleri Dergisi, 29*(2), 57-65.

Baker, W. M., Lusk, E. J., & Neuhauser, K. L. (2012). On the use of cell phones and other electronic devices in the classroom: Evidence from a survey of faculty and students. *Journal of Education for Business, 87,* 275-289.

Barkley, J. E., & Lepp, A. (2013). Cellular telephone use is associated with greater sedentary behavior independent of leisure-time physical activity. *Applied Physiology, Nutrition, and Metabolism, 38*(10), 1023.

Baturay, M. H., & Toker, S. (2015). An investigation of the impact of demographics on cyberloafing from an educational setting angle. *Computers in Human Behavior, 50,* 358-366.

Bowman, L. L., Levine, L. E., Waite, B. M., & Gendron, M. (2010). Can students really multitask? An experimental study of instant messaging while reading. *Computers & Education, 54*(4), 927-931.

Brubaker, A. T. (2006). Faculty perceptions of the impact of student laptop use in a wireless internet environment on the classroom learning environment and teaching information and library science. Unpublished master's thesis, North Carolina University, North Carolina.

Bulduklu, Y., & Özer, N. P. (2016). Young people's smartphone use motivations. *Journal of the Human and Social Sciences Researches, 5*(8), 2963-2986.

Chen, Q., & Yan, Z. (2016). Does multitasking with mobile phones affect learning? A review. *Computers in Human Behavior, 54,* 34-42.

Çınar, O., & Cinisli, Z. (2018). In-class cyberloafing among undergraduate students of physical education and sports teaching department. *Journal of Physical Education and Sports Studies, 10*(1), 39-48.

Çok, R., & Kutlu, M. (2018). Üniversite öğrencilerin ders esnasında ders dışı internet kullanım davranışları ile akademik güdülenme düzeylerinin çeşitli değişkenlere göre incelenmesi. *The Journal of International Lingual Social and Educational Sciences, 4*(1), 1-21.

Denk, M. (2007). Mobile learning-challenges and potentials. *International Journal of Mobile Learning and Organisation Archive, 1*(2), 122-139.

Erdem, H., Türen, U., & Kalkın, G. (2017). Mobil telefon yoksunluğu korkusu (nomofobi) yayılımı: Türkiye'den üniversite öğrencileri ve kamu çalışanları örneklemi. *Bilişim Teknolojileri Dergisi, 10,* 1-12.

Ergün, E., & Altun, A. (2012). Öğrenci gözüyle siber aylaklık ve nedenleri. *Eğitim Teknolojisi Kuram ve Uygulama, 2*(1), 36-53.

Ezemenaka, E. (2013). The usage and impact of Internet enabled phones on academic concentration among students of tertiary institutions: A study at the University of Ibadan, Nigeria. International *Journal of Education and Development using Information and Communication Technology, 9*(3), 162-173.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2009). *How to design and evaluate research in education*. (7th ed.). New York: McGraw-Hill.

Gao, Q., Yan, Z., Zhao, C., Pan, Y., & Mo, L. (2014). To ban or not to ban: Differences in mobile phone policies at elementary, middle, and high schools. *Computers in Human Behavior*, *38*, 25-32.

Hawi, N. S., & Samaha, M. (2016). To excel or not to excel: Strong evidence on the adverse effect of smartphone addiction on academic performance. *Computers & Education*, *98*, 81-89.

Hembrooke, H., & Gay, G. (2003). The laptop and the lecture: The effects of multitasking in learning environments. *Journal of computing in higher education*, *15*(1), 46-64.

Hiscock, D. (2004). Cell phones in class: This, too, shall pass. *Community College Week*, *16*, 4-5.

Holsheimer, M., Kertsen, M., Manila, H., & Toivonen, H., (1995). A perspective on databases and data mining, *Proceeding of 1st International Conference on Knowledge and Data Mining*, 150-155, Montreal, Canada.

Jackson, L. D. (2012). Is mobile technology in the classroom a helpful tool or a distraction?: A report of university students' attitudes, usage practices, and suggestions for policies. *International Journal of Technology, Knowledge & Society*, *8*(5).

Kalaycı, E. (2010). *Üniversite öğrencilerinin siber aylaklık davranışları ile öz düzenleme stratejileri arasındaki ilişkinin incelenmesi.* Yayınlanmamış yüksek lisans tezi. Hacettepe Üniversitesi, Ankara.

Karabatak, M., & İnce, M. C. (2004). Apriori algoritmasi ile öğrenci başarısı analizi. *Elektrik Elektronik Bilgisayar Mühendisliği Sempozyumu*, 8-12 Aralık, Bursa.

Karaoğlan-Yılmaz, F.G., Yılmaz, R., Öztürk, H.T., Sezer, B. and Karademir, T. (2015). Cyberloafing as a barrier to the successful integration of information and communication technologies into teaching and learning environments. *Computers in Human Behavior*. *45*, 290-298.

Khan, J., Malik, Z. K., & Amin, S. (2015). The impact of mobile phones on the performance of university students. *Research Journal of Humanities and Social Sciences*, *6*(1), 61-66.

Kim, I., Kim, R., Kim, H., Kim, D., Han, K., Lee, P. H., ... & Lee, U. (2019). Understanding smartphone usage in college classrooms: A long-term measurement study. *Computers & Education*, *141*, 103611.

Knight, R. M. (2017). Academic cyberloafing: A study of perceptual and behavioral differences on ın-class cyberloafing among undergraduate students. Master Thesis of Arts in Psychology, East Carolina University, North Carolina.

Koşar, D. (2018). Öğretmen adaylarının cep telefonu kullanımına ilişkin görüşlerinin incelenmesi. *Uluslararası Sosyal Araştırmalar Dergisi*, *11*(55), 643-654.

Lan, Y. F., & Sie, Y. S. (2010). Using RSS to support mobile learning based on media richness theory. *Computers & Education, 55(*2), 723–732.

Lepp, A., Barkley, J. E., Sanders, G. J., Rebold, M., & Gates, P. (2013). The relationship between cell phone use, physical and sedentary activity, and cardiorespiratory fitness in a sample of US college students. *International Journal of Behavioral Nutrition and Physical Activity*, *10*(1), 79.

Licoppe, C. (2004). Connected presence: The emergence of a new repertoire for managing social relationships in a changing communications technoscape. *Environment and planning society and space, 22,* 135-156.

Mwilima, F., & Hangula, V. (2010). The effects of cell phone use on academic performance in tertiary education. *International Journal of Law, Humanities & Social Science, 1*(5), 33-38.

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004). Mobile technologies and learning. *Futurelab Literature Review Series, Report No, 11*.

Ott, T., Magnusson, A. G., Weilenmann, A., & af Segerstad, Y. H. (2018). It must not disturb, it's as simple as that: Students' voices on mobile phones in the infrastructure for learning in Swedish upper secondary school. *Education and Information Technologies,* 23(1), 517-536.

Park, W. K. (2005). Mobile phone addiction. *In mobile communications* (pp. 253-272), R. Ling ve E. Pedersen (Eds.). London: Springer.

Ragan, E. D., Jennings, S. R., Massey, J. D., & Doolittle, P. E. (2014). Unregulated use of laptops over time in large lecture classes. *Computers & Education, 78,* 78–86.

Ravizza, S. M, Uitvlugt, M. G, & Fenn, K. M. (2017). Logged in and zoned out: how laptop internet use relates to classroom learning. *Psychological Science, 28,* 171–180.

Ruiz, M. D., Gómez-Romero, J., Molina-Solana, M., Campaña, J. R., & Martin-Bautista, M. J. (2016). Meta-association rules for mining interesting associations in multiple datasets. *Applied Soft Computing, 49,* 212-223.

Sánchez-Martínez, M., & Otero, A. (2009). Factors associated with cell phone use in adolescents in the community of Madrid (Spain). *CyberPsychology & Behavior, 12*(2), 131-137.

Sage, M. (2015). Cyberloafing: A study of personality factors and organizational commitment as predictor variables of cyberloafing and perceived organizational acceptance. Unpublished master's thesis, East Carolina University, Carolina.

Selwyn, N. (2003). Schooling the mobile generation: The future for schools in the mobile-networked society. *British Journal of Sociology of Education, 24*(2), 131-144.

Tavolacci, M. P., Meyrignac, G., Richard, L., Dechelotte, P., & Ladner, J. (2015). Problematic use of mobile phone and nomophobia among French college students. *The European Journal of Public Health, 25,* 172-188.

Uğur, N. G., & Turan, A. H. (2015). Üniversite öğrencilerinin mobil uygulamaları kabulü ve kullanımı: Sakarya üniversitesi örneği. *İnternet Uygulamaları ve Yönetimi, 6*(2), 63-79.

Varol, F., & Yıldırım, E. (2018). An examination of cyberloafing behaviors in classrooms from students' perspectives. *Turkish Online Journal of Qualitative Inquiry, 9*(1), 26-46.

Vitak, J., Crouse J., & LaRose, R. (2011). Personal internet use at work: Understanding cyberslacking. *Computers in Human Behavior, 27,* 1751-1759.

Wu, J., Mei, W., & Ugrin, J. C. (2018). Student cyberloafing in and out of the classroom in China and the relationship with student performance. *Cyberpsychology, Behavior, and Social Networking, 21*(3), 1-6.

Yıldırım, Ç., Sumuer, E., Adnan, M., & Yıldırım, S. (2016a). A growing fear: Prevalence of nomophobia among Turkish college students. *Information Development*, *32*, 1322-1331.

Yıldırım, K., Yaşar, Ö., & Duru, M. (2016b). Öğretmen ve öğrenci görüşleri temelinde akıllı telefonların eğitim öğretim ortamlarında kullanılmasının ve etkilerinin incelenmesi. *Uluslararası Eğitim, Bilim ve Teknoloji Dergisi*, *2*(2), 72-84.

Yusufoğlu, Ö. Ş. (2017). Smartphones as leisure activities and their impact on social life: A research on students of the university. *Journal of the Human and Social Sciences Researches, 6*(5), 2414-2434.

Yuwanto, L. (2018). Academic flow and cyberloafing. *Psychology Research, 8*(4), 173-177.