Int J Edu Sci, 18(1-3): 36-46 (2017)
DOI: 10.31901/24566322.2017/18.1-3.04

Educational Uses of Smartphones by Students at the Northern Border University in the Kingdom of Saudi Arabia

Farhan Yetaim Alenezi

Deanship of e-Learning and Distance Learning, Northern Border University (NBU), Arar, Saudi Arabia
E-mail: Farhan425@hotmail.com

KEYWORDS Educational Technology. E-learning. Higher Education. Internet. Mobile Learning. Distance Learning. Smartphones

ABSTRACT This research identifies the degree of smartphone uses for educational purpose by Foundation Year students at Northern Border University (NBU) in Saudi Arabia, and barriers limiting such uses. It discovered differences in uses to barriers limiting that to gender, subject and grade variables. Researcher used analytical descriptive approach of questionnaire tool for data collection with 259 students' sample. The researcher found significant use of smartphones by students for educational purpose including imaging information, test result queries and checking e-mails etc. It showed no differences in the degree of uses according to gender variable, but difference in uses attributable to subject and grade. It found significant sample agreement barriers limiting smartphone uses in education like ongoing battery charging, lack of harmony in few smartphone programs for computers to limited storage capacities. It found differences in barriers related to gender, but no difference in barriers, according to subject and grade variables.

INTRODUCTION

The present time is featured through the evolution of various communications technologies and the diversities of various such tools used, which resultantly brought a quantum leap in data transferring besides increasing the amount of information bought or published through such technology tools (Kor and Dunder 2017).

The advent of smartphones is one of the most important of such technological developments. It has provided many features and applications which have a profound impact on the lifestyle changes. Smartphones are one of the fastest spreading technologies, and evolve at enormous speed in terms of features and applications (Alkhathaami 2016).

Where the smartphones can be defined as mobile phones that use the sophisticated operating systems in order to send or receive voice and video calls, in which we can open files, provide Internet and e-mail services, social networking services, and many other applications, such as the iPhone, Galaxy, and BlackBerry devices (Zhang 2015).

We must, therefore, realize that smartphones and wireless devices have indeed led to a radical shift in the societal concepts for the acquisition of knowledge. They add value in our urge to explore new forms of learning in everything from knowledge of work, arts, languages, commerce or even crime, to name a few. With greater access to information and knowledge at any time and in any place, there is an equally immense challenge to the educational institutions to make strategic plans to utilize smartphones in the best possible way. They can thus evaluate smartphones' relationship with education, technology, and community in the current context which is now more vital than ever through phone use.

Recently, smartphones and their applications in the education sector had proved greatly effective due to them playing significant and leading roles. Such a changing scenario has thus been seen due to their unique uses. Most students expect from their respective universities to follow the strategies which consequently lead to use of smartphones in the educational field (Poll 2015).

It has indeed become common to see the use of smartphones in many educational institutions at various levels (Gao et al. 2014). Many studies (Al-Emran et al. 2016; Fabian et al. 2016; Attia 2014) show positive trends among the students regarding use of smartphones in education. It is due to the inherent advantages of such phones.

Most important advantages of smartphones, to name a few, include easy portability at all times, easy access to Internet and knowledge sources, including Web 2 tools, such as social networking sites, wikis and blogs etc. that increase students' motivation to learn at any time and in any place (Jeno et al. 2017).

Nikou and Economides (2017) reported that smartphones could be used to increase mental and cognitive growth on the personal level, and to increase motivation levels when there is a real person's desire to develop them for their skill enhancement. Smartphones also support the collaborative learning concept by creating opportunities to interact with, and to communicate scientific cooperation, through use of web applications for two smartphone tools in the educational field (Gikas and Grant 2013).

Many studies (Yang et al. 2015; Al-Zahrani 2015; Zhang 2013) addressed the advantages and benefits of use of smartphones in the areas of education, wherein they emphasized that smartphones help to motivate the students to learn, and to maintain their interests in them. They support students to participate in the learning interactions, interaction between students and teachers, and between the students with each other as well.

In addition, smartphones can be used to increase the educational achievement and for the development of critical thinking skills, as well as development of learning styles through their multiple applications. Moreover, smartphones facilitate communication process through Internet usage thus they ease many areas including checking e-mails, searching databases for scientific information, reading and saving books and articles to facilitating exchange of files or e-books at any time and from any place, as well as helping to share knowledge and to create opportunities for communication and collaboration of knowledge (Cosier et al. 2015).

A study conducted by Albulasi (2014) on the students of the College of Education revealed that through using smartphones in teaching, better outcomes are offered than with the traditional methods of teaching in the current context. The study revealed that whenever smartphones were used they proved helpful with raising the levels of cognitive performance in the post achievement test for the experimental group.

Also, the importance and usefulness of smartphones lie in the different types of applications which run through such phones, especially since those applications are developed and constantly being updated, they remain special application supports for academic staffs, students, and special administrative applications in the educational aspect. In addition, smartphones also have presence of dozens of multi-use applications which can be used in more than one areas of the educational field.

Algaid (2014) conducted study on the students of King Abdulaziz University in Saudi Arabia on the use of smartphones and availability of electronic information sources and researched that ninety-eight percent students in the study sample used Internet through smartphones in order to search for the electronic information sources. It also resulted into the study of the existence of a strong desire among the students towards using smartphone applications in educational process. It thus confirmed that ninety-six percent of the respondents said they would like to hold training sessions or workshops on the ways to deal with smartphone applications in the fields of electronic information sources.

A study conducted by Alsanusi (2013) indicated decrease in the extent of use of smartphones by students in the areas of education, where the study sampled students in the Faculty of Arts at the University of Dammam in Saudi Arabia. Abdulati (2015) studied use of smartphones and tablet device applications in e-Learning context, and explained that fifty-six percent of respondents used their smartphones to deal with e-Learning management system (Blackboard).

Bomhold (2013) conducted a study about educational uses of smartphone apps with the university students, which asserted that most frequently used applications were search engines that most students usually use on their smartphones in order to research information from Internet. Also, a study by Alkhathami (2016) about smartphone applications, with a sample of 124 students of Faculty of Computer and Information Sciences at the Imam University, found that whole study sample used social networking applications through their smartphones. It also resulted that WhatsApp application ranked first in the use, followed by Twitter, then YouTube, and then Google Plus.

On the other hand, there are many obstacles which limit use of smartphones by students in

educational purposes. Alomary (2014) confirmed that human obstacles exist as well as material obstacles, and as mentioned some human obstacles, such as rules and regulations of universities prohibiting the use of smartphones during lectures, and not activating faculty members' applications for smartphones in education. It is in addition to conviction of some students to faculty members that smartphones lead to distracting learners during lectures.

As for physical obstacles, it was stated that highest ranking of such obstacles are speed and smartphone battery charging related issues, especially with the high Internet usage. High subscription fees to Internet and expensive costs to purchase smartphones.

Likewise, studies by Ferreira et al. (2013) and Hwang and Wu (2014) mention other barriers to use smartphones in educational sector like difficulties to maintain students' focus on the learning activities, difficulties to display scientific materials often only available for a limited period only for either texts or images, difficulties to read from phones for longer time period due to smaller screen sizes. Small size of keyboards, inability to print from the smartphones directly, limited storage, limited capacity of some smartphones and some of the associated health effects are other possible obstacles.

Frequent use of smartphones is not considered suitable for health reasons as well. Also, ignorance towards the benefits of smartphones and their educational applications, as well as overall educational potential, is the main reason to limit their use in educational field (Alzahrani 2015).

Problem of the Study

It is clear from the foregoing studies the importance of use of smartphones in educational areas, and their role to develop scientific, intellectual, and social skills of students can't be ruled out. They are helpful to save time and effort to use Internet besides easy access to research and academic information. Its use in communication and knowledge sharing and several other educational applications to have valuable benefits are equally imperative.

This researcher, in the capacity of a faculty member in Educational Technology at NBU, noticed that some students took advantage of smartphones by availing multiple applications for education area as well. Smartphones commensurate with features and benefits as various applications, in spite of their multiple uses in the areas of non-educational sectors, sought student attention. This researcher saw the need to determine the actual level of the extent of smartphone uses in the educational areas by university students, as well as identify obstacles which limit such uses. Their relationship with some variables was also evaluated. This study thus tries to answer the following questions:

1. How far and to what extent smartphones can be used for educational purposes by the Foundation Year students at NBU?
2. Are there any statistically significant differences in the degree of smartphones used for the educational purposes by the Foundation Year students at NBU related to gender, subject and grade?
3. What are the challenges which hinder use of smartphones for educational purposes by the Foundation Year students at NBU?
4. Are there any statistically significant differences in the barriers which limit the use of smartphones for educational purposes by the Foundation Year students at NBU related to gender, subject and grade?

Aim of the Study

This research paper aims to determine the degree to which smartphones are used in the educational aspects by the Foundation Year students at NBU. It also identifies the barriers which limit such uses, if any. The study further aims to discover the differences in the degree of such usages, and obstacles limiting it to certain variables like gender, subject and grade.

Importance of the Study

The use of smartphones in education is a new use of technology in the education sector. Although some studies have already been conducted in this area, there remains ample scope for further studies as well. And, thus there is an urgent need for new studies for two reasons, as mentioned here: To study and discuss the topics which have not been studied previously.

Secondly, due to rapid changes in the use of smartphones, constant evolution and updating, as well as issuance of a modern and sophisticated application which changes the patterns of

use of such phones, it becomes imperative for the researchers to study usage and benefits of such applications besides evaluating the latest benefits they offer in the education sector.

The importance of this study also lies in the importance of use of smartphones and their applications in the educational areas to the benefits gained from them as advantages and the services enjoyed in various ways. The importance of this study also lies in the importance of students, and necessity to take advantage of the modern technologies in order to prepare them to improve skills and to develop personalities on all scientific, intellectual and social levels.

This study thus tries to determine the degree of students' smartphone uses and to help the relevant authorities at the universities to develop their appropriate plans to develop such uses. It also identifies the barriers which help to develop appropriate solutions to overcome such obstacles. As well as knowing differences in the usage and barriers for some variables, it helps the decision makers to understand the concept to the fullest and in most accurate degree. It will help them to set appropriate development plans in accordance to differences, if there are any.

METHODOLOGY

Research Approach

This research was conducted at NBU in the Kingdom of Saudi Arabia, with a quantitative approach based on a questionnaire being used to conduct the study.

Population of the Study

Study's population consisted of all Foundation Year students at NBU, whose total population was 1,845 and was represented by both male and female students in the academic year 2016-2017.

Study Sample

The study sample was selected randomly from the Foundation Year that included the subjects of both male and female students. For this research, 31 of the 291 questionnaires, which were distributed, got eliminated due to lack of completeness, or those whose answers on one pattern in all phrases or had two answers on same single phrase, with a total sample size reaching to 259 male and female students, representing fourteen percent of the total study community.

The Study Sample Characteristics

A. Gender

Table 1 shows the three factors of percentage, number and gender for total calculation as part of the students returning questionnaire through the gender variable.

Table 1: Students returning questionnaires by gender

Gender	*Number*	*Percentage*
Male	56	145
Female	44	114
Total	100	259

B. Subject

Table 2 represents the three factors of percentage, number and subject for total calculation as part of the students returning questionnaire through the subject variable.

Table 2: Students returning questionnaires by subject

Subject	*Number*	*Percentage*
Medicinal	38.2	99
Scientific	27.4	71
Humanity	34.4	89
Total	100.0	259

C. Grade

Table 3 provides the three factors of percentage, number and grade for total calculation as

Table 3: Students returning questionnaires by grade

Grade	*Number*	*Percentage*
Less than 2	12.7	33
From 2 to less than 3.75	37.1	96
From 3.75 to less than 4.5	30.1	78
From 4.5 and more	20.1	52
Total	100.0	259

part of the students returning questionnaire through the grade variable.

After reviewing the theoretical literature and previous studies on the subject of this study, the researcher built a tool by beginning with the preliminary questions about initial data which included the three variables: Gender, Subject, and Grade. Then, the two main sections: First section contained 19 items about the uses of smartphones in educational fields, while the Second section contained 16 items about the challenges which hindered the use of smartphones in the educational purposes.

Validity of the Tool

The veracity of the tool was ascertained by subjecting it to two kinds of validities, as follows:

A) Arbitrators Validity

After the construction of the tool in its final form, the researcher presented it to a group of experts, and then made adjustments that included deleting, adding, and modifying items based on the observations of arbitrators.

B) Internal Consistency Validity

To ensure that consistency of each section's items with each other in the section to which it belonged, the researcher measured the sincerity of internal consistency of tool through the subjects' responses in this study. And, then calculated the alpha Cronbach's coefficient, where value in the section of use was (0.89) and in the section of barriers was (0.80), which confirmed validity of internal consistency of the tool.

Reliability of the Tool

The reliability of the tool was calculated through the method of (Test-Retest), where the study tool was applied to 30 students in the Foundation Year, who were randomly selected from outside the main sample of this study. And, then there was a re-application after two weeks on the same sample, as has been stability of tool calculated by using the Pearson correlation coefficient (Person-correlation), which was (0.84) and which indicated the stability of the tool.

Data Analysis

The data were analyzed using the SPSS program, and thus used the following statistical methods of data analysis:

- Percentages, to describe the characteristics of the study sample.
- Cronbach's Alpha-Correlation to determine validity of the internal consistency of the study tool
- Person-Correlation to determine the reliability of the study tool
- Arithmetic mean and standard deviation to order the responses of the study sample.
- Mann-Whitney Test to investigate the differences in the responses of the study sample by gender.
- Kruskal-Wallis Test to investigate the differences in the responses of the study sample, according to subject and grade.

When analyzed, the responses of the study sample were considered that, if the mean value was:

- From (1) to (1.74), the degree of agreement from the point of view of the sample is very little.
- From (1.75) to (2.49), the degree of agreement from the point of view of the sample is little.
- From (2.50) to (3.24), the degree of agreement from the point of view of the sample is large.
- From (3.25) to (4), the degree of agreement from the point of view of the sample is very large.

It applied to the tool section which already applied to the Questionnaire items, as in the previous division.

RESULTS AND DISCUSSION

First Question: How Far and to What Extent are Smartphones Used for Educational Purposes by the Foundation Year Students at NBU?

To answer this question, the researcher calculated the means and standard deviations for the students' responses about the statement which was concerned with their use of smartphones in the educational field. Statements in the Table 4 show that, which ranked descending by mean according to the relative importance of

Table 4: Students self-reported about their usage of smartphones in the educational field

Statement	*Mean*	*Standard deviation*
Take photos for the information that I need	3.52	0.84
Inquire about the results of my exams	3.38	0.90
Communicate with colleagues in the field of specialization to inquire about educational areas	3.30	0.93
Check email	3.15	1.00
Use the Internet in educational fields	3.15	0.87
Use some smartphone applications, such as dictionaries and other educational applications	3.12	0.92
Use social networking sites such as Twitter, Facebook, YouTube etc., in the educational field	3.07	0.97
Exchange files and e-books through my smartphone via some applications, such as Telegram, Tango, WhatsApp etc.	3.05	0.98
Follow up all that is new in my subject	2.98	0.98
Write down educational notes on my smartphone	2.90	1.11
Save files and e-books on my smartphone	2.81	1.04
Check out university ads	2.74	1.13
Prepare my academic timetable	2.65	1.19
Access to e-books	2.59	1.08
Exchange messages with my teachers to inquire about educational points	2.58	1.07
Submit my homework and follow their feedback	2.56	1.10
Participate in educational forums on the Internet	2.29	1.09
Buy some educational materials via the Internet	2.24	1.12
Audio recording of lectures	2.20	1.18
Use section	2.86	0.58

each statement from students' self-reported perspectives.

Table 4 shows the sample opinion of the degree of their use of smartphones in the educational field, where ranked the first use "take photo for the information that I need" with a mean of 3.52, which may attribute to the usefulness of this use from their point of view, that taking photos of the information instead of writing it will save time and effort. It was followed by the second use to "inquire about the results of my exams", with a mean of 3.38.

Students agreed that they mostly used their smartphones to communicate with their colleagues, to inquire about some educational points, as well as to check e-mails. This may be due to ease of use of conducting these acts via their smartphones, and the possibility of doing so at any time and from any place. Furthermore, availability of phones with students at all times added more value.

The final standing of the use was "audio recording of lectures" with a mean of 2.20, which may be attributed to the difficulty of recording lectures and to listen to that for the length of time of the lecture. Also, it may well be attributed to the refusal of some academic staffs to allow voice recordings of lectures. This also occupied the standing before the last usage of "buy educational materials via the Internet", which could be due to the lack of a buying culture via Internet, as well as lack of confidence in people with regards to making purchases via Internet.

It is clear from the total mean of the use section (2.86) that the degree of smartphone uses in the educational field by students is large, which may attribute to their conviction in the importance of use of smartphones in education, and to their awareness of many benefits they find as a result of the use of such phones, and their applications in education like saving time and efforts to ease of access to Internet and for access to information. In addition to their privileges of communication, they also share knowledge easily.

Many studies support these findings, including Algaid (2014), which found that ninety-eight percent of the study sample used their smartphones to search for electronic information sources, as well as a study by Fabian et al. (2016) resulted in showing that there is a presence of positive attitudes among the students towards use of smartphones in educational fields. It is because smartphones make it easy to connect to Internet, search databases and to facilitate the exchange of files and e-books (Cosier et al. 2015).

Al-Zahrani (2015) and Zhang (2013) studies confirmed importance of using smartphones in education, and their role to motivate students to learn, increases educational attainment, as well as develop their critical thinking skills.

Second Question: Are There any Statistically Significant Differences in the Degree of Smartphones Used for Educational Purposes by the Foundation Year Students at NBU Related to Gender, Subject and Grade?

To answer this question, the researcher used the Mann-Whitney Test to investigate the differences between the means of the sample responses on the use of smartphones in educational fields, according to gender. The researcher also used the Kruskal-Wallis Test in order to investigate differences between the means, according to the subject and grade.

Firstly: Differences in the Degree of Use According to Gender

Table 5 shows that there are no statistically significant differences in the degree of use of smartphones in the educational fields related to 'Gender'.

Table 5: Mann-Whitney test for differences between the sample responses in the degree of uses according to gender

Statistical significance	*Gender*	
	Female	*Male*
0.296	2.81	2.92

This may be attributed to the conviction of both male and female respondents in the importance of the use of smartphones and their applications in educational processes, and their understanding of the advantages and benefits of their uses in these areas.

Secondly: Differences in the Degree of Use According to Subject

Table 6 shows that there are statistically significant differences in the degree of use of smartphones in the educational fields attributed to the subject, at a level of significance (0.05), for medicinal subjects, then for scientific subjects, followed by humanity subjects. This means that students with medicinal subjects occupy the first place by using their smartphones in the areas of education, followed by the students with scientific subjects, then the students with humanity subjects.

Table 6: Kruskal-Wallis test for differences between the sample responses in the degree of use according to subject

Statistical significance	*Subject*		
	Humanity	*Medicinal*	*Scientific*
0.038	2.73	2.90	2.95

This result may be due to the seriousness and attention of students with medical and scientific subjects and their eagerness to gain the benefits and to consume advantages of technology in education, including smartphones, as much as they can be compared to the students with humanity subjects.

Thirdly: Differences in the Degree of Use According to Grade

It is clear in the Table 7 that there are statistically significant differences in the degree of use of smartphones in the educational fields according to grade, at a level of significance (0.01), for the students with high grades, followed by those having lower grades descending. It means that the students having the grades of 4.5 or more, ranked first to use smartphones in education, followed by second place which is of students who have grades between 3.75 to less than 4.5, and then at the third place students who had grades from 2 to less than 3.75 came. And, in the last place were those with grades of less than 2.

Table 7: Kruskal-Wallis test for differences between the sample responses in the degree of use according to subject

Statistical significance	*Grade*			
	From 4.5 and more	*From 3.75 to less than 4.5*	*From 2 to less than 3.75*	*Less than 2*
0.001	3.01	2.99	2.77	2.56

This result may be attributed to that of serious and privileged students who may be keener

than others to gain and share knowledge through use of best tools, especially smartphones being one of the best new technologies. It helped them to do so.

It also confirms the role of smartphones and their benefits to use in the education sector, as evidenced by the high statistical significance of differences which are present in the extrusive close association between the degree of use of smartphones in education, and student grades. When the use is high, the grade is high, and vice versa.

Third Question: What are the Challenges That Hinder the Use of Smartphones for Educational Purposes by the Foundation Year Students at NBU?

To answer this question, the researcher calculates the means and standard deviations for students' responses about the statement which is concerned with the challenges and which might hinder the use of smartphones in the educational fields.

The statements in the Table 8 show which ranked descending by mean, according to the relative importance of each statement from the students' self-reported perspectives.

Table 8 shows a sample of opinions in the barriers which might limit use of smartphones in the educational fields. Wherein, the first challenge from the sample point of view is: "need to charge smartphone batteries constantly." As is known, most smartphone users generally suffer from how quickly smartphone batteries run out of charge, especially if they use some applications on the phones and while surf Internet for example, as well as those from the most important barriers - 'Lack of harmony in most smartphone applications with those on computers', which may be attributed to the fact that most students have a computer and smartphone, and thus carry out some work on smartphones, which cannot be moved on to, and be completed on, the computer and vice versa.

That makes it imperative for students to use only one device, which then hinders students' use of smartphones applications if not harmonious with those on computers.

The third challenge is 'limitations of smartphone storage capacity', as smartphone storage capacity is limited compared to computers, especially when students download many applications and save files from e-Books to videos and pictures of education text, and so on.

It is worth mentioning that barrier - 'Lack of knowledge in the optimum use of smartphones apps in education', occupied the last place in barriers, which means that the respondents believe that less obstructions may hinder the use of smartphones in education, which indicates that students generally have good experience and knowledge with the use of smartphones in education.

Table 8: Students self-reported about challenges to use smartphones in the educational fields

Standard deviation	*Mean*	*Statement*
The need to charge smartphone battery constantly	3.18	0.85
Lack of harmony in most smartphone applications with those on computers	2.90	0.92
Limited smartphone storage capacity	2.87	1.06
The inability to print directly from a smartphone	2.87	0.99
The high cost of smartphones	2.85	1.04
University laws and regulations prohibiting the use of smartphones during lectures	2.84	1.18
The frequent use of smart phones and their adverse effects on health	2.84	0.96
High subscription fees of Internet use on smartphones	2.83	1.10
Weakness of the Internet in universities	2.83	1.10
Non-activation of faculty members at the university for the use of smartphones in Education	2.70	1.03
Difficulty of transforming educational materials to formulas commensurate with the smartphones	2.64	1.00
I do not have time to use the smartphone applications in education	2.43	0.97
Difficulty of using a smartphone in the educational field because of its small panel keys	2.38	0.97
I don't have conviction in the usefulness of using smartphone applications in the educational field	2.33	0.99
Difficulty of reading information because of the small smartphone screen	2.31	1.00
Lack of knowledge in the optimum use of smartphones apps in education	2.31	0.99
Challenges section	2.69	0.50

This generation is more knowledgeable and has more experience of using technology than the previous generation. It is mainly due to the fact that they have grown up in an era of technology. Thus it may be that some students have more skills in the use of smartphones than even some members of the academic staff.

It is clear from the total mean (2.69) that the degree of students' agreement to these obstacles is high, which may be due to the similarity of advantages, services, applications, and disadvantages of most types of smartphones. It is also possibly due to being attributable to some university policies and infrastructure with respect to use of smartphones.

These results are consistent with Alomary's (2014) study which confirmed that there is a presence of human obstacles and material obstacles to limit use of smartphones in education by students, where he stated that most important physical obstacle is speed at which smartphone batteries run out of charge.

Furthermore, it is also due to increased costs of purchasing smartphones. Also, Hwang and Wu (2014) reported some other barriers, like difficulties to print from smartphones directly, difficulties to read from smartphones for longer time period, and for limited storage capacity.

Fourth Question: Are there Any Statistically Significant Differences in the Barriers That Limit the Use of Smartphones for Educational Purposes by the Foundation Year Students at NBU to Gender, Subject and Grade?

To answer this question, the researcher used the Mann-Whitney Test to investigate differences between the means of the sample responses in challenges to use smartphones in the educational field. According to gender, Kruskal-Wallis Test was used to investigate the differences between the means, according to the subject and grade.

Firstly: Differences in the Challenges According to Gender

It is shown in Table 9 that there are statistically significant differences in the degree of challenges to use smartphones in the educational fields related to gender, at the level of significance (0.01) for male students. This may be attributed to the fact that some of the barriers have more of an impact on males than on females. For example, the obstacle of 'the need for a battery to charge your smartphone constantly' affects males more because they tend to leave house more than females, due to community culture in Saudi Arabia, which means that sources to charge their smartphones are more limited.

Table 9: Mann-Whitney test for differences between the sample responses in the challenges according to gender

Statistical significance	*Gender*	
	Female	*Male*
0.003	2.59	2.78

Secondly: Differences in the Challenges According to Subject

Table 10: Kruskal–Wallis test for differences between the sample responses in the challenges according to subject

Statistical significance	*Subject*		
	Humanity	*Scientific*	*Medicinal*
0.379	2.75	2.72	2.63

Thirdly: Differences in the Challenges According to Grade

As shown in Tables 10 and 11 there were no statistically significant differences in the barriers of use of smartphones in educational fields due to the variables of subject and grade. It may be attributed to the drawbacks and defects in smartphones which often hinder their uses in education, such as need to charge the battery continuously, high cost of smartphones, and difficulty of directly printing, afflicting all students regardless of their gender or subject.

Table 11: Kruskal–Wallis test for differences between sample responses in the challenges according to grade

Statistical significance	*Grade*			
	From 4.5 and more	*From 3.75 to less than 4.5*	*From 2 to less than 3.75*	*Less than 2*
0.495	2.60	2.67	2.74	2.77

These disadvantages and barriers are related to characteristics of smartphones themselves. And, also the policies and regulations of universities with respect to electronic services and the use of smartphones do matter. The creation of infrastructure for the integration of technology in the educational field, including tools, strategies and regulations to support or hinder the use of smartphones in the areas of education are equally crucial. They apply to all students regardless of their different subjects and grades, which leads to the agreement of their point of view in terms of existing barriers.

CONCLUSION

This result concludes with the findings that the Foundation Year students at NBU used their smartphones for educational purpose and found that significant as well. They preferred using their smartphones to image information, queried test results, interaction and communication with each other and so did they inquire about various educational points. Furthermore, they used smartphones extensively to browse Internet besides for e-mailing purpose.

This research found no differences in the degree of students' use of smartphones in the areas of education, according to gender. It though proved the existence of differences in medical subject, followed by scientific and then humanity subject. It also proved existence of differences due to variable of grades for high grades, followed by lower to ending by the lowest grades.

Students agreed to the large extent on the existence of several obstacles limiting the use of smartphones in education. The most significant obstacles were need to charge smartphone batteries on an ongoing basis, no harmony on smartphone applications with computers and last but not the least limited storage capacity in some smartphones. The inability to print directly from smartphones was one more obstacle. Besides the above mentioned differences, the barriers to use smartphones for educational purpose related to gender as well.

RECOMMENDATIONS

Through analyzing the study's findings, this researcher recommends the following for the future researchers to work on this area. The future researchers should therefore focus on the following important factors:

- University should set up policies and mechanisms that allow students to use smartphones for educational purposes in lectures.
- Hold training sessions for the faculty members to develop skills to use smartphones in the educational fields.
- Provide high speed wireless Internet access to all university facilities and make that available to all students as well.
- Design a smartphone application for universities to include all e-Services offered by the particular educational institutions for a new technological resurgence.

REFERENCES

Abdulati HA 2015. Employment of smart mobile devices and tablets in e-learning. *Generation of Humanities and Social Sciences Journal*, 9: 167-179.

Albulasi RA 2014. The Effectiveness of the Use of E-learning and Smartphones on the Achievement of Education College Students and Development of Their Attitudes Toward Them. *23rd Scientific Conference of the Egyptian Council for Curriculum and Instruction, entitled Curriculum Development Visions and Orientations*, 1: 174-202.

Al-Emran M, Elsherif HM, Shaalan K 2016. Investigating attitudes towards the use of mobile learning in higher education. *Computers in Human Behavior,* 56: 93-102.

Algaid AG 2014. Attitudes of King Abdulaziz University students towards the use of smartphones and the availability of electronic information sources. *The Journal of King Fahd National Library,* 20(2): 290-339.

Alkhathami MD 2016. Mobile apps by students of the Faculty of Computer and Information Sciences, Imam Muhammad bin Saud Islamic University: Descriptive study. *Jordan Journal of Social Sciences*, 9(1): 75-92.

Alomary MA 2014. The degree of the utilization of mobile learning applications by graduate students at the Faculty of Education in Yarmouk University and the obstacles to such utilization. *Almanarah Journal*, 20(1): 269-300.

Alsanusi HA 2013. The extent of consciousness of Dammam University students using mobile learning. *Arabic Studies in Education and Psychology,* 43(2): 127-148.

Alzahrani AH 2015. The attitudes of secondary school teachers towards providing textbooks via smartphones in the Ministry of Education in Saudi Arabia: An exploratory study. *Journal of the Arabic Center for Research and Studies in Libraries and Information Science*, 2(3): 1-28.

Al-Zahrani AS 2015. *Smartphones Wandering at the Mall: A Case Study Investigating the Use of Smartphones on English Oral Learning Skills in a Collaborative Mobile-assisted Language Learning En-*

vironment. Doctoral Dissertation. USA: Northern Illinois University.

Attia MA 2014. The attitudes of Arabic students as a second language towards m-learning and their necessary training needs to use. *Education and Psychology Journal,* 46: 37-63.

Cosier M, Gomez A, McKee A, Maghzi KS 2015. Smartphones permitted: How teachers use text messaging to collaborate. *Education and Information Technologies,* 20(2): 347-358.

Fabian K, Topping KJ, Barron IG 2016. Mobile technology and mathematics: Effects on students' attitudes, engagement, and achievement. *Journal of Computers in Education,* 3(1): 77-104.

Ferreira JB, Klein AZ, Freitas A, Schlemmer E 2013. Mobile learning: Definition, uses and challenges. *Cutting-edge Technologies in Higher Education,* 6: 47-82.

Gikas J, Grant MM 2013. Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones and social media. *The Internet and Higher Education,* 19: 18-26.

Gao Q, Yan Z, Wei C, Liang Y, Mo L 2017. Three different roles, five different aspects: Differences and similarities in viewing school mobile phone policies among teachers, parents, and students. *Computers & Education,* 106: 13-25.

Hwang GJ, Wu PH 2014. Applications, impacts and trends of mobile technology-enhanced learning: A review of 2008–2012 publications in selected SSCI journals. *International Journal of Mobile Learning and Organisation,* 8(2): 83-95.

Hyman JA, Moser MT, Segala LN 2014. Electronic reading and digital library technologies: Understanding learner expectation and usage intent for mobile learning. *Educational Technology Research and Development,* 62(1): 35-52.

Jeno LM, Grytnes JA, Vandvik V 2017. The effect of a mobile-application tool on biology students' motivation and achievement in species identification: A self-determination theory perspective. *Computers and Education,* 107: 1-12.

Kör H, Erbay H, Engin M, Dünder E 2017. An examination of the correlation between science and technology attitudes scale, frequency of smartphone usage scale and lifelong learning scale scores using the structural equation model. *Journal of Baltic Science Education,* 16(1): 86-99.

Nikou SA, Economides AA 2017. Mobile-based assessment: Investigating the factors that influence behavioral intention to use. *Computers and Education,* 109: 56-73.

Poll H 2015. Pearson Student Mobile Device Survey 2015. National Report: Students in Grades 4-12. From <http://www.pearsoned.com/wp-content/uploads/2015-Pearson-Student-Mobile-Device-Survey-Grades-4-12.pdf> (Retrieved on 20 October 2016).

Bomhold CR 2013. Educational use of smartphone technology: A survey of mobile phone application use by undergraduate university students. *Program,* 47(4): 424-436.

Yang X, Li X, Lu T 2015. Using mobile phones in college classroom settings: Effects of presentation mode and interest on concentration and achievement. *Computers and Education,* 88: 292-302.

Zhang L 2013. Mobile Phone Technology Engagement in EFL Classroom. *Proceedings of the 2013 International Conference on Software Engineering and Computer Science,* 27-29 September, Yichang, China.

Zhang YA 2015. *Handbook of Mobile Teaching and Learning.* Berlin: Springer-Verlag.

Paper received for publication on March 2017
Paper accepted for publication on May 2017