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USAGE OF SMARTPHONES TECHNOLOGY IN LEARNING ENVIRONMENT AND ITS EFFECT ON ACADEMIC PERFORMANCE AMONGST NURSING STUDENTS

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ABSTRACT

Background: Definitely, the current generation of health care students has grown up encompassed by information technology. Hence, the accessibility and the usage of smart phone gadgets among the students of higher education have been keeping on developing. For this, smart phone technology can make a significant contribution to the process of teaching, learning and academic performance.

Aim: To assess the effect of smartphone technology usage in learning environment on academic performance amongst nursing students.

Design: A descriptive, correlational, cross-sectional design was used to guide this study.

Setting: The study was conducted in the accredited nursing science department, faculty of medicine, A. B. U., Zaria, Nigeria.

Sample: A convenience sample of (No.225) respondents from all over the five academic years.

Tools: Data collected by using a five part questionnaire as follows, 1) Demographic data sheet, 2) Usage of smartphone technology questionnaire, 3) Usefulness of smartphone technology usage questionnaire, 4) Applications of smartphone technology usage questionnaire, 5) Effectiveness of the smartphone technology usage questionnaire.

Results: Smartphone technology usage levels in learning environment had a significant effect on self-reported academic performance throughout the academic years.

Conclusion: That smartphone technology as a learning tool can help students to achieve or perform well their studies but in the same time, Smartphone technology as learning tool might be hinders the nursing students from getting the deserved score in their studies (GPA).

Recommendation: Nursing educators should design educational methods, activities, and material that are suitable for smartphone technology.

KEYWORDS: Nursing Students, Smartphone Technology, Learning Environment, Academic Performance.

INTRODUCTION

Noticeably, in a higher education, availability and usage of smart phone gadgets amongst the students have kept on increasing (***George & Dellasega, 2011; Haque, Sugathan, Ali, Islam, &Haque, 2016***). These smart phone gadgets are more appealing amongst a higher education students for several reasons; one of them is that the smart phone gadgets are less costly when compared with normal personal computers; additionally, it is conservative tools and become more

affordable, effective, and simple to use (***Nassuora, 2012***).

Today, smart phones can make a significant contribution to the process of teaching and learning which has resulted in the appearance of the mobile learning (M-learning) concept (***Subramaniam & Harun, 2013***). The smart phone gadgets connect the users to the world instantly, permit access to information, empowering communication outside the classroom, improving collaboration, creativity, and connecting students with experts, especially in their scholastic lives (***George & Dellasega, 2011; Haque, Sugathan, Ali, Islam, &Haque, 2016***).

Clearly, in the baccalaureate nursing program, the learning environment is shared among a classroom, hospital, community and other educational settings (***Asadizaker, et el, 2015***). Particularly in clinical learning environment, students might encounter many challenges as they apply theoretical knowledge and practical skills gained in academic settings in health care settings. Therefore, smartphone technologies can be an important resource for clinical practice because of their accessibility. As well, their use is consistent with the notion that clinical decision support is a core function of health information systems (***Cho, Kim, Kim, et al., 2010).*** Thus, nurse educators should explore the use of smartphone technologies to support nursing students in clinical training as they provide easy access to quality educational material at the point of care (***O'Connor & Andrews, 2015***), especially the current generation of students has grown up encompassed by information technology (***McAndrew & Johnston, 2012***).

According to Apple, 63% of all students enrolled in colleges and universities own smart phones. As to this, smart phone devices can be positively used by educators in classrooms as a teaching and learning device (***Subramaniam &Harun, 2013***). Smartphone technology refers to an extraordinarily featured mobile phone that includes computer capability and connectivity. It is thought to be an extremely compelling gadget to support its user in various ways (***Nielsen Mobile, 2011***). Concomitant with the adoption of smartphone technology, a wide variety of software applications has been developed for healthcare professionals (***Mosa, Yoo, &Sheets, 2012***). A smartphone technology application is "a software program utilized on a smartphone technology relating to business, efficiency, stimulation, references, gaming and media" (***Smith, 2012).*** There are some of the applications that are particularly designed for healthcare professionals such as medical reference tools and medical guidelines, for example, resuscitation algorithms, drug guidelines and medical calculators (***Phillippi, & Wyatt, 2011***).

Furthermore, smartphone technology is now capable of storing high quality ultrasonography and CT and, coupled with the high-resolution cameras, mobile radiology can be used to gain rapid opinions from senior colleagues when trainees are off site, permitting early intervention and potentially better patient outcomes (***Abboudi & Amin, 2011; Makanjuola & Bultitude, 2012***). In a recent study, nurses in practice frequently access clinical resources through their smartphones, nearly 80% of nurse utilized smartphones to find information regarding medication therapies (***Grabowsky***, ***2015***).

In nursing education, smartphone technology can be used, for a quick access to course content, educational materials and guidelines during clinical procedures, classes, or clinical conferences and acquire information related to students' performance. Students can review instructional videos prior to performing skills and readily reach their clinical instructor via the message system (***Phillippi, & Wyatt 2011***). Furthermore, the use of smartphone technology can significantly enhance blended learning (***Echeverría, et, al, 2011***).

It appears that smartphone technology is capable to contribute to student academic performance (***Bull &McCormick, 2012; Tao & Yeh, 2013***). In this way, the students' progress and how they learned not only a significant issue for those involved in the educational system, but for all those who are interested in improving the quality of higher education (***Talebi, Davodi, & Khoshroo, 2015***). Each student academic success is determined by their performance during classroom tasks, projects, demonstrations and examinations (***Ong, Bessie, & Cheong, 2009***).

In general, the term performance was defined by Tuckman 1975 as the obvious demonstration of sympathetic, ideas, skills and knowledge of a person and planned grade clearly indicate the performance of a student (***Kibona, & Mgaya, 2015***). Turning to, smartphone technology, it has been forced students to change their learning styles. Thus, faculties need to consider ways to merge these changes while providing meaningful learning experiences that prepare students with the knowledge and skills for healthcare delivery through careful planning and attention to smartphone technology as an innovative method for teaching and accordingly, change the rules and policies of educational institutions (***Phillippi, & Wyatt 2011***).

SIGNIFICANCE OF THE STUDY

Learning occurs wherever a learner is and maybe not tied on a space inside a brick and mortar building or even confined to a space inside an online course management system (***Gikas& Grant, 2013***). In the context of higher education, the smartphone is a popular accessory already in the pocket of many nursing students. The number of smartphone users worldwide will outperform 2 billion in 2016, as indicated by new figures from e-marketer—after almost arriving in 2015. One year from now, there will be more than 1.91 billion smart phone users over the globe, a number that will expand another 12.6% to close to 2.16 billion in ***2016***." (***Haque, Sugathan, Ali, Islam, & Haque, 2016***). Meanwhile, with up to 87% of healthcare professionals using them during clinical practice for data management and accessibility (***Chatterley & Cheick, 2010)***. And little is known about the number of nurses who use smartphone technology. This limitation may be, in part, due to the vast number of nurses in the US, approximately 2.6 million (***Bureau of Labor Statistics, 2010***).

In addition, with the expanding consideration now being given to the role of smartphone in the educational sector in developing countries. Consequently, the benefits of Smartphone technology are not merely limited to increased access to educational services. Smartphone learning, can also facilitate changes in the character of learning modalities that in turn impact educational outcomes. In this regard, smartphone learning represents more than a mere extension of traditional forms of education; smartphone learning facilitates alternative learning processes and instructional methods that the theories of new learning identify as effective for learning (***Valk, Rashid, & Elder, 2010***). Accordingly, a noteworthy motivation behind this study was to shed the light on the new role of the smartphone technology as one of the learning modalities that is viable.

STUDY AIM

The study aimed at measuring the effect of smartphone technology usage in learning environment on academic performance amongst nursing students.

RESEARCH QUESTION

What is the effect of the effect of smartphone technology usage in the learning environment on academic performance amongst nursing students?

RESEARCH DESIGN

For the study purpose, a descriptive, correlational, cross-sectional design was used to guide this study.

SETTING

This study was conducted in the accredited nursing science department, faculty of medicine, Ahmadu Bello University, which considered the largest university in Nigeria and second largest university in Africa and located in the Zaria city.

STUDY SAMPLE

A convenience sample of (No.225) nursing students who were enrolled in the Bachelor of Nursing program all through the five scholastic years were enlisted to participate in the current study. The sample incorporated into the present study was distributed as follows, (No.70) students in the first scholarly year (100 Level) (No.53) students in the second scholastic year (200 Level), (No.59) students in the third scholastic year (300 Level), (No.30) students in the fourth scholastic year (400 Level), and (No.13) in the fifth scholastic year (500 Level). The Inclusion criteria were limited to both male and female nursing students who had used smartphone technology in the previous 12 months, who agree to participate in the current study and who went to the persistent scholarly year, while the exclusion criteria was nursing students who 'declined to partake in the study.

DATA COLLECTION TOOL

Data were collected from the participants utilizing a five part questionnaire that was developed by the researcher after systematically appraising the significant literature and questionnaires which already utilized in a comparative reviews (***Chen, Park, & Putzer, 2010; Rossing et. al, 2012; Ramamuruthy, Viji,, Srinivasa & Rao, 2015; & Chaves, 2015***).

- ***1st Part: Demographic data sheet:*** It contains demographic characteristics of undergraduate nursing students such as (age, gender, and marital status, academic level and last semester academic performance (GPA).
- ***2nd Part: Usage of Smartphone technology Questionnaire*** : It contains (20 item) which partitioned into seven measurements as follows:1) data entry/ clinical documentation (3items),2) information access (7items),3) alerts and reminders (4items),4) clinical decision support (3items), 5) clinical communication (3items). As for scoring system, the rating depended on a five-point scale with anchors of (1) strongly disagree (2) disagree (3) don't know (4) agree (5) strongly agree. Total scores were classified as 1) infrequently usage (< 60%), 2) occasionally usage (<75%), 3) frequently usage (>75%).
- ***3rd Part***: ***Usefulness of Smartphone technology Usage Questionnaire*** :It contains (36 items), which divided into five dimensions as follows;1) developing learners' creative thinking (5items),2) developing communication skills (6 items),3) fostering collaborative learning (5 items),4) promoting autonomous learning (15 items),5) promoting learners' satisfaction (5 items). As for scoring system, the rating depended on a five-point with anchors of (1)

strongly disagree (2) disagree (3) don't know (4) agree (5) strongly agree.

- ***4th Part: Applications of Smartphone technology Usage Questionnaire***. It contains (15 item). The scoring system, was 2 points likert scale for replying to these questions as follows; 1 for (yes), zero for (no) was used.
- ***5th Part: Effectiveness of the Smartphone technology Usage questionnaire***: It contains (9 item). The scoring framework, was 2 points likert scale as follows; 1 for (yes), zero for (no) was used.

VALIDITY TEST

The developed self-administered questionnaire was submitted to three experts in the field of nursing education. They were asked to comment on the structure and layout of the instrument in terms of the clarity of the questionnaire instructions, readability, and ease of understanding, question sequence, and completion time, then, questionnaire was edited according to experts' suggestions.

PILOT STUDY

Earlier to any attempt for data collection, the agreement was approved by the relevant authorities, then, pilot study was done on (no 23) students, which constitute (10 %) of the total sample who met the inclusion criteria was incorporated into the pilot study. The role of this test was to ensure the clarity of the questionnaire, consistent, and easily comprehended by the students. The students were asked to give comments on the questionnaire 'items in term of clarity and completeness. After carrying out the pilot study, the needed alteration was done to statements that not clear before embarking on the full-scale questionnaire.

RELIABILITY TEST

For the study purpose, the reliability of all the variables under investigation was projected using Cronbach's Alpha coefficient for the internal consistency of the questionnaire. The reliability test was done to determine how strongly the attributes were related to each other and to the composite score. The Chronbach's alpha analysis for each dimension was (0. 860) and Cronbach's Alpha based on standardized items was (0..933), demonstrating outstanding and sufficient internal consistency.

ETHICAL CONSIDERATION

Official permission was gotten from the relevant authorities and from the nursing students to conduct the study after an indication of the aim and the importance of the study. Oral consent was obtained from the students before their cooperation in the study. Each nursing student was allowed to either partake or not in this study. The confidentiality of the study invitees was addressed as follows, during data collection, the responses of participants were anonymized, and the researcher remained blinded to who was submitting the responses.The collected data were strictly confidential, and wasn't released for any reason, it was utilized just for research purposes.

DATA COLLECTION PROCEDURE

Before gathering the data, with a specific end goal to develop the questionnaire, the following steps were carried out. Firstly, an audit of the literature was conducted and other questionnaires examining smartphone use by the nursing students or health care providers were reviewed. Based upon this auditing, a draft questionnaire was developed. Then the

draft version of the questionnaire was reviewed by the pertinent authorities to take their approval for the study. Based upon the remarks, modifications were made to a limited number of items in the questionnaire. After that the content validity was established to test whether this new questionnaire had an appropriate sample of items and adequately covered the study variables and aim. Then the pilot study and finally the reliability analysis was done also. After that as soon as the official permission was gotten from the relevant authorities to collect the final data, each class rep was approached to ascertain the entire population of all the five academic years also, to explain the aim of the study and to identify the suitable time to approach the study sample of the studied sample. Moreover, for each scholastic year, the lectures and classroom locations, timetables in the camps were known. At that point, depending on the lecture timetable, the study questionnaire was dispersed to partakers in their break time to be done at their convenience after a comprehensive clarification of the study purpose in the attendance of the class rep of each scholastic year. The students were given 30 minutes to fill the questionnaire and to return it. The data collected separately for each scholastic year. A total of 300 questionnaires were distributed. However, a response rate of 75% was observed because of the lack of accomplishment of a lot of questions. The data collected in two weeks, five days each week. The data collected in the (second semester) of July 2016.

DATA ANALYSIS

Data were examined utilizing the statistical package for the social sciences (SPSS) 22.0.Descriptive statistics (Mean scores and SD for continuous variables and number and percentages for categorical variables) were utilized to describe participant characteristics and scores on the self-assessment questionnaire. The significance level was chosen as ($p < 0.05$).

RESULTS

Concerning, demographic profile of the studied sample, the sample consisted of (No.225) from all the academic years was recruited to participate in the study. Concerning, the studied sample age, (51.4%) of (100 level) students their age ranged between (18-25) years old, (50.9%) of (200 level) students their age ranged between (26-30) years old 49.2% of the third year (300level) students their age ranged from (26 to 30) years old. (76.7%) of the fourth year (400 level) students their age ranged between (31-35) years old. All (100 %) of (500 level) students their age ranged from (31 to 35). In addition, there was a highly statistically significant difference between the frequency distribution of the study sample classified by age ($P<0.000$).

With respect to studied sample' gender, (65.7%) of (100 level) students were male students, (66%) of (200level) were male students, (64.4%) of (300level) were female students, (90%) of (400level) were female students. Finally (69.2%) of (500level) were female students. Likewise, there was a highly statistically significant difference between the frequency distribution of the studied sample as indicated by gender ($P<0.000$).

As regards studied sample' marital status, (71%) of the studied sample were single. Where (26.7%) were in (100level), followed by (19.1%) were in (300level). Moreover, a highly statistically significant difference was found between the frequency distribution of nursing students' classified by the marital status ($P<0.001$).

Table (1) shown that there was a highly significant difference between the studied sample mean scores of the perceived smartphone usage in a learning environment throughout the academic years (F=18. 49, Sig=0. 000). Where, (500 level) 'students had gotten the highest mean scores than their counterparts ($\bar{x}$ =65.0, SD =5.65).Meanwhile,

(100 level) students had gotten the lowest mean score ($\bar{x}$ =51.77, SD =5.69).

When asking about the participants' perception concerning the smartphone technology usage for data entry/ clinical documentation, as noted in the findings that a highly significant difference was found in the studied sample mean scores regarding the smartphone technology usage for data entry/ clinical documentation throughout the academic years (F=7.705, Sig=0. 000). Where the 400 level students had gotten the highest mean scores than their counterparts ($\bar{x}$ =10.46, SD =3.26). Meanwhile, the 100 level students had gotten the lowest mean score ($\bar{x}$ =7.71, SD =1.42).

As for the perceived smartphone technology usage for information access, the findings indicated that there was a highly significant difference in the studied sample mean scores regarding the perceived smartphone technology usage for information access throughout the academic years (F=15.99, Sig=0. 000). Where, the 500 level students had gotten the highest mean scores than their counterparts ($\bar{X}$ =24.92, SD =3.79). Meanwhile, the 100 level students had gotten the lowest mean score ($\bar{X}$ =17.94, SD =3.52).

With respect to the perceived smartphone technology usage for alerts and reminders, the results revealed that there was a highly significant difference between the studied sample mean scores of the perceived smartphone technology usage for alerts and reminders throughout the academic years (F=3.784, Sig=0. 000). Where, the (400 level) students had gotten the highest mean scores than their counterparts ($\bar{X}$ =12.66, SD =3.23). In the meantime, the 100 level students had gotten the lowest mean score ($\bar{X}$ =10.61, SD =2.88).

Concerning the perceived smartphone technology usage for decision support, a highly significant difference was found between the studied sample mean scores of the perceived smartphone technology usage for decision support throughout the academic years (F=5.428, Sig=0. 000). Where, the (500level) students had gotten the highest mean scores than their counterparts ($\bar{X}$ =10.76, SD =2.047). In the interim, the (100 level) students had gotten the lowest mean score ($\bar{X}$ =7.71, SD =2.06).

As regards the perceived smartphone technology usage for clinical communication, a highly significant difference was found in the studied sample mean scores regarding the perceived smartphone technology usage for clinical communication throughout the academic years (F=4.07, Sig=0.003). Where the 200 level students had gotten the highest mean scores than their counterparts ($\bar{X}$ =8.90, SD =2.29.Meanwhile, the 100 level students had gotten the lowest mean score ($\bar{X}$ =7.78, SD =1.37).

As presented in table (2) that there was a highly significant difference in all over the studied sample mean score regarding the perceived usefulness of smartphone technology usage in the learning environment throughout the academic years (F=4.902, sig=0.001).Where the 500 level students had gotten the highest mean scores than their junior counterparts ($\bar{X}$ =105.38, SD =13.85). Meanwhile, it is found that the lowest mean scores was recorded for the (100 level) students ($\bar{X}$ =95.09, SD =8.73).

As for the perceived usefulness of smartphone technology usage for developing the creative thinking. It is found that the highest mean scores was recorded for (300 level) students than their counterparts ($\bar{X}$ = 14.49, SD =3.86) regarding the perceived usefulness of smartphone technology usage for developing creative thinking. Meanwhile, it is found that the lowest mean scores was documented for (400 level) students ($\bar{X}$ = 12.46, SD =1.96).

Referring to, the perceived usefulness of smartphone technology usage for developing the communication skills, it is found that there was a highly significant difference between the studied sample mean score regarding the perceived usefulness of smartphone technology usage for developing communication skills throughout the academic years (F=6.928, Sig=0.000). Where the (100 level) studied sample had gotten the highest mean scores than their counterparts ($\bar{X}$ =17.55, SD =4.616).

With respect to the perceived usefulness of smartphone technology usage for fostering the collaborative learning, a highly significant difference was found in the studied sample mean scores regarding the perceived usefulness of smartphone technology usage for fostering collaborative learning throughout the academic years (F=4.455, Sig=0.002). Where, the 500 level students had gotten the highest mean scores than their counterparts ($\bar{X}$ =16. 38, SD =3. 77).Meanwhile the 100 level studied sample had gotten the lowest mean score ($\bar{X}$ =13. 81, SD =2. 37).

As regards, the perceived usefulness of smartphone technology usage in promoting the autonomous learning, the results indicated that there was a highly significant difference between mean scores of the perceived usefulness of smartphone technology usage in promoting the studied sample autonomous learning throughout the academic years (F=5. 855, Sig=0. 000). Where the 500 level students had gotten the highest mean scores than their counterparts ($\bar{x}$ =41. 15, SD =2. 733). Meanwhile the (200 level) students had gotten the lowest mean score ($\bar{X}$ =36. 11, SD =4. 86).

In relation to the perceived usefulness of smartphone technology usage in promoting satisfaction, a highly significant difference was found between the studied sample mean scores of the perceived smartphone technology usage in promoting satisfaction throughout the academic years (F=6. 094, Sig=0. 000). Where the (400 level) students had gotten the highest mean scores than their counterparts ($\bar{X}$ =19. 00, SD =3. 61). Meanwhile, it is found that the lowest mean scores was recorded for the (100 level) students ($\bar{X}$ =14. 45, SD =2. 27).

With respect to the perceived usage of a smartphone technology applications. Referring to figure (1) the results shown that (45.7%) of (100 level) students was utilized medical calculators, (44.3%) of 100 level students was utilized medical dictionaries. Besides, (41.5%) of 200 level was utilized medical calculators. In addition, as for 300 level (44.1%) of them was looking up medication, (40.7%) was looking up nursing interventions/ care plans. likewise, (40.7 %) was taking notes in class/ lab. As for 400 level students (53.3%) of them was looking up nursing interventions/ care plans, (50.0%) was looking up lab /diagnostic information, (46.7%) was present lectures. Additionally, as for 500 level (61.5%) of them was present lectures.

Concerning perceived usage of smartphone technology level classified by gender differences. Figure (2) revealed that (69.6 %) of 100 level male students used smartphone technology infrequently,(55.6%) of 200 level female students used smartphone technology infrequently, As well as, (48.6 %) of 200 level male students used smartphone technology frequently. Despite what might be expected, (63.2%) of 300 level female used smartphone technology infrequently, in the meantime, (38.1%) of male students used smartphone technology frequently. Furthermore, (66.7%) of 400 level male used smartphone technology occasionally and the rest of them used smartphone technology frequently, and (75.0%) of 500 level male students used smartphone technology occasionally. Moreover, the results revealed that there was a highly significant difference between the percentage of the frequent usage of smart phones levels of the studied sample in relation to their gender and academic year (X^2=27.83, Sig=0.000).

With respect to the perceived effectiveness of the smartphone technology usage. Figure (3) demonstrated in relation to 100 level students that (41.4%) of them expressed that smartphone technology was aiding them in studying, followed by (40.0%) reported that smartphone technology might lead to distraction. In the meantime, (28.6%) stated that smartphone technology may prompt to the risk of cross-infection.

Concerning, (200 level) students, (45.3%) of them admitted that smartphone technology was aiding in studying, followed by (41.5%) believed that smartphone technology might lead to risk of cross-infection and (41.5%) indicated that smartphone technology might lead to distraction. In the interim, (32.1%) of them disapproved that the gadget was expensive. As for (300 level) students, (45.8%) of them indicated that the smartphone technology may prompt to risk of cross-infection, (45.8%) of them reported that the smartphone technology aiding in studying, (42.4%) of them complain from the high cost of data subscription. In the meantime, (30.5%) of them gripe that the gadget was expensive.

Regarding, (400 level) students, (46.7%) of (400level) students stated that the smartphone technology might lead to risk of cross-infection likewise, (46.7%) of them reported that smartphone technology might lead to wasting time. Meanwhile, (40.0%) reported that smartphone technology was aiding in studying.

As for (500 level) students, (61.5%) of them revealed that the smartphone technology was aiding in studying, followed by (53.8%) of them grumble from the high cost of data subscription and (46.2%) declared that smartphone technology might lead to distraction.Meanwhile, (23.1%) of them complain that the gadget was expensive.

With respect to the studied sample GPA throughout the academic years, figure (4) demonstrated that, there was a highly significant difference among the studied sample GPA throughout the academic years (X^2=34.30, Sig=0.001). Where, (55.7%) of (100level) students had gotten (D) level, (52.8%) of (200 level) students had gotten (D) level, (49.2%) of 300 level students had gotten (c) level, (53.3%)of 400level students had gotten(C) level, and (53.8%) of 500 level students had gotten (D) level.

Concerning the perceived usage of smartphone technology levels in relation to self-reported academic performance throughout the academic years. Figure (5) indicated that there was a significant difference between the percentages of the usage of smart phones levels in relation to the studied sample self-reported last academic performance throughout the academic years (X^2 =34.30, Sig=0.000). With respect to the studied sample that infrequently used smart phone technology throughout the academic years, the results demonstrated that (45.5%) of 100 level students, had gotten (D) level, (42.1%) of 200 level students had gotten (D) level, (53.7%) of 300 level students had gotten (C) level, (55%) of 400 level students had gotten (c) level, (50.0%) of 500 level students had gotten (D)level and (50.0%) of (500 level) students had gotten (C) level.

Concerning, the studied sample that occasionally utilized smart phone technology throughout the academic years, as demonstrated the findings that (78.3%) of (100 level) students had gotten (D) level, (47.1.0%) of (200 level) students had gotten (D) level, (44.0%) of (300 level) students had gotten (D) level, (55.6%) of (400 level) students had gotten (c) level. (50.0%) of (500 level) students had gotten (D) level and (50.0%) of (500 level) students had gotten (c) level. In relation to, the students that frequently utilized smart phone throughout the academic years, the results demonstrated that (66.7%) of (100 level) students, had gotten (B) level, (70.6 %) of (200 level) students, had gotten (D) level. (50%) of (300 level) students, had gotten (D) level, All (100%) of the (400 level) students, had gotten (D) level, (66.7) % of

(500 level) students had gotten (D) level in the last academic performance.

Table 1: Comparing the Perceived Smartphone Technology Usage in Learning Environment throughout the Academic Years (No.225)

Dimensions		100 Level (No.70)	200 Level (No.53)	300 Level (No.59)	400 Level (No.30)	500 Level (No.13)	Total (No.225)	F	P value
Data Entry/ Clinical Documentation	$\bar{x}$	7.71	8.88	8.52	10.46	8.61	8.62	7.705	0.000**
	±SD	±1.42	±2.50	±2.52	±3.26	±1.50	±2.44		
Information Access	$\bar{x}$	17.94	21.90	20.50	22.83	24.92	20.60	15.99	0.000**
	±SD	±3.52	±5.27	±3.65	±1.96	±3.79	±4.40		
Alerts and Reminders	$\bar{x}$	10.61	12.43	11.76	12.66	12.61	11.73	3.784	0.005**
	±SD	±2.88	±3.47	±3.27	±3.23	±2.10	±3.22		
Decision Support	$\bar{x}$	7.71	8.50	8.45	9.36	10.76	8.49	5.428	0.000**
	±SD	±2.06	±2.92	±2.60	±2.37	±2.047	±2.56		
Clinical communication	$\bar{x}$	7.78	8.90	8.11	7.93	8.07	8.17	4.07	0.003**
	±SD	±1.37	±2.29	±1.32	±1.08	±1.03	±1.62		
Total	$\bar{x}$	51.77	60.64	57.37	63.26	65.0	57.62	18.49	0.000**
	±SD	±5.69	±12.12	±6.67	±4.79	±5.65	±8.98		

(*) Statistically Significant at p<0.05

Table 2: Comparing the Perceived Usefulness of Smartphone Technology Usage in Learning Environment throughout the Academic Years (No.225)

Dimensions		100 Level (No.70)	200 Level (No.53)	300 Level (No.59)	400 Level (No.30)	500 Level (No.13)	Total (No.225)	F	P value
Developing learners' Creative Thinking	$\bar{x}$	12.78	13.39	14.49	12.46	14.07	13.40	4.212	0.003**
	±SD	±2.16	±2.44	±3.86	±1.960	±2.43	±2.84		
Developing Communication skills	$\bar{x}$	17.55	14.92	15.25	14.06	15.92	15.77	6.928	0.000**
	±SD	±4.616	±2.69	±3.23	±2.82	±4.050	±3.80		
Fostering collaborative learning	$\bar{x}$	13.81	13.84	15.54	14.73	16.38	14.54	4.455	0.002**
	±SD	±2.37	±2.17	±3.616	±4.118	±3.77	±3.152		
Promoting Autonomous Learning	$\bar{x}$	36.48	36.11	38.79	39.36	41.15	37.65	5.855	0.000**
	±SD	±4.829	±4.86	±5.30	±4.42	±2.733	±5.031		
Promoting learners' Satisfaction	$\bar{x}$	14.45	18.30	17.47	19.00	17.84	16.95	6.094	0.000**
	±SD	±2.27	±9.06	±4.048	±3.61	±4.37	±5.53		
Total	$\bar{x}$	95.09	96.59	101.55	99.63	105.38	98.34	4.902	0.001**
	±SD	±8.73	±12.70	±10.92	±8.045	±13.85	±10.97		

(**) Highly Statistically Significant At P<0.01

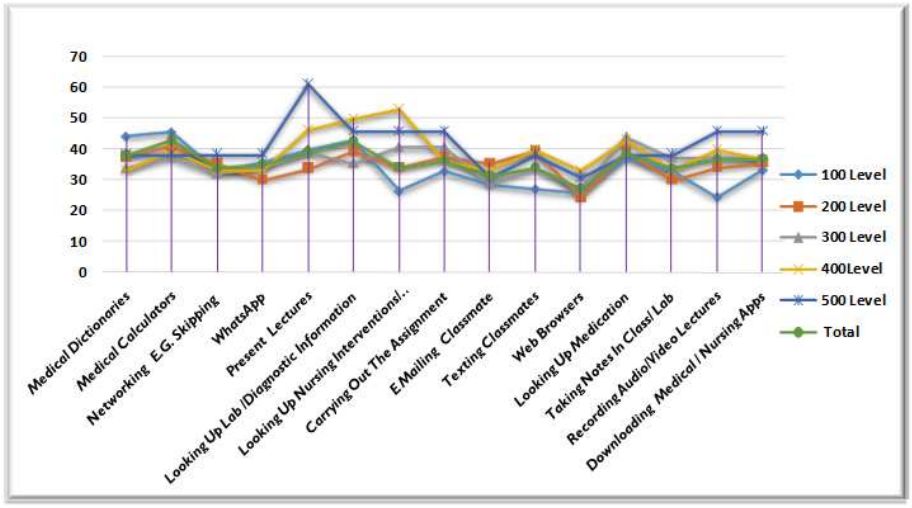


Figure 1: Comparing the Perceived Usage of Smartphone Technology Applications in learning Environment throughout the Academic Years (No.225)

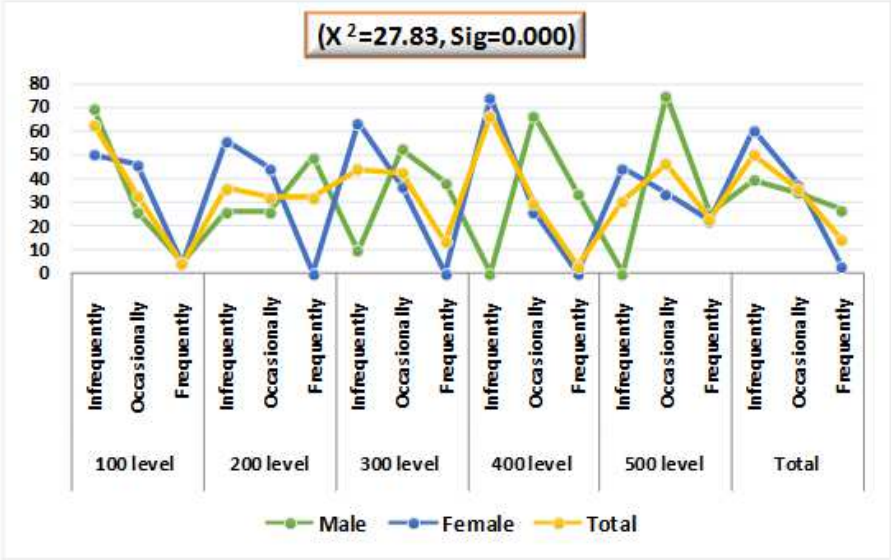
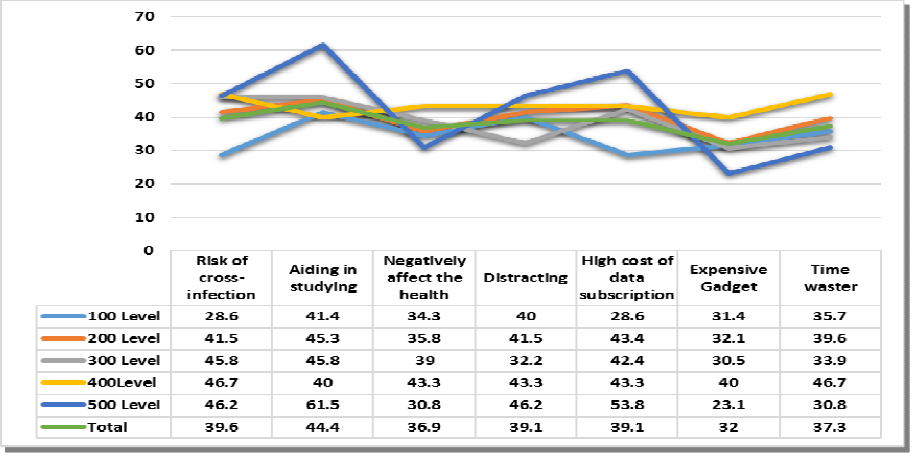
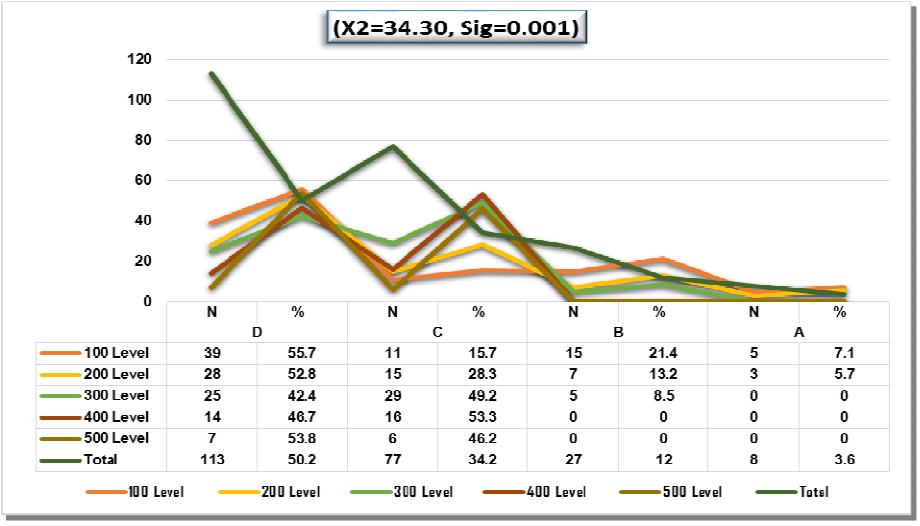


Figure 2: Gender differences on the Perceived Usage Level of Smartphone Technology in Learning Environment throughout the Academic Years (No.225)



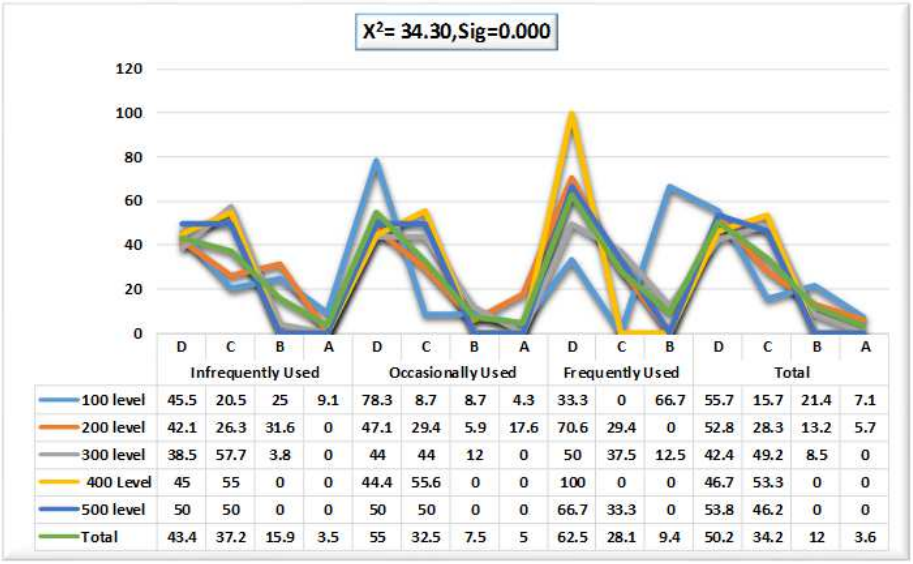
	Risk of cross-infection	Aiding in studying	Negatively affect the health	Distracting	High cost of data subscription	Expensive Gadget	Time waster
100 Level	28.6	41.4	34.3	40	28.6	31.4	35.7
200 Level	41.5	45.3	35.8	41.5	43.4	32.1	39.6
300 Level	45.8	45.8	39	32.2	42.4	30.5	33.9
400Level	46.7	40	43.3	43.3	43.3	40	46.7
500 Level	46.2	61.5	30.8	46.2	53.8	23.1	30.8
Total	39.6	44.4	36.9	39.1	39.1	32	37.3

Figure 3: Perceived Effectiveness of the Smartphone Technology Usage According to the Studied Sample Academic Year (No.225)



	N	%	N	%	N	%	N	%
	D		C		B		A	
100 Level	39	55.7	11	15.7	15	21.4	5	7.1
200 Level	28	52.8	15	28.3	7	13.2	3	5.7
300 Level	25	42.4	29	49.2	5	8.5	0	0
400 Level	14	46.7	16	53.3	0	0	0	0
500 Level	7	53.8	6	46.2	0	0	0	0
Total	113	50.2	77	34.2	27	12	8	3.6

Figure 4: Percentage Distribution of the Studied Sample GPA throughout the Academic Years (225)



	D	C	B	A	D	C	B	A	D	C	B	D	C	B	A
	Infrequently Used				Occasionally Used				Frequently Used			Total			
100 level	45.5	20.5	25	9.1	78.3	8.7	8.7	4.3	33.3	0	66.7	55.7	15.7	21.4	7.1
200 level	42.1	26.3	31.6	0	47.1	29.4	5.9	17.6	70.6	29.4	0	52.8	28.3	13.2	5.7
300 level	38.5	57.7	3.8	0	44	44	12	0	50	37.5	12.5	42.4	49.2	8.5	0
400 Level	45	55	0	0	44.4	55.6	0	0	100	0	0	46.7	53.3	0	0
500 level	50	50	0	0	50	50	0	0	66.7	33.3	0	53.8	46.2	0	0
Total	43.4	37.2	15.9	3.5	55	32.5	7.5	5	62.5	28.1	9.4	50.2	34.2	12	3.6

Figure 5: Perceived Usage of Smartphone Technology Levels in Relation to Self-Reported Academic Performance throughout the Academic Years (No.225)

DISCUSSIONS

Technology has brought a lot of changes incorporating in education (***Pachler, Bachmair, & Cook, 2010***). Accordingly, nowadays, the conventional methods of teaching and learning have lost their efficiency with the emergent innovation. Along these lines, to keep pace with the changing environment, it is imperative to look for new strategies of knowledge transfer and learning (***Rabiee & Talebiyan, 2011***). Therefore, nursing educators needs to face these challenges by designing a new learning experience that will result in graduates equipped to practice in an altering health care environment (***Benner, Sutphen, Leonard, & Day, 2010***). Thus, the study sought to measure the effect of smartphone technology usage in learning environment on academic performance amongst nursing students.

Concerning the smartphone technology usage for data entry/ clinical documentation, a highly significant difference was found in the studied sample mean scores regarding the smartphone technology used for data entry/ clinical

documentation throughout the academic years. Where, the (400 level) students had gotten the highest mean scores than their counterparts'.Meanwhile, the 100 level students had gotten the lowest mean score. This study produced results which corroborate the findings of ***Mihailidis, Krones, & Boger (2006)*** who found that the smartphone technology usage were a useful mechanism for data entry, communication capability as perceived by the studied sample. According to ***Silvery, Macri, Lee, &Lobach, (2005)*** clinical documentation is a record of the critical thinking and judgment that facilitating consistency and effective communication among health care providers. The type of medical devices utilized is essential as a part of guaranteeing that documentation can be adequately incorporated into the clinical work process of a specific clinical environment. As indicated by ***Husain et al., (2010),*** healthcare is complex and often requires specialty knowledge and expertise. Locating resources to solve complex medical problems is often challenging. In light of the fact that smartphone technology applications support and permit the convenient access to specialty information in areas such as radiology, neurology, pediatrics, Neonatology, and continuing education activities.

As for the perceived smartphone technology usage for information access, a highly significant difference was found in mean scores of the studied sample regarding the usage of a smartphone technology for information access throughout the academic year's. Where, the (500 level) students had gotten the highest mean scores than their counterparts. Meanwhile, the (100 level) students had gotten the lowest mean score. A possible explanation for this might be that the student lives in the age of information and open skies, in which access to information has become so easy, and one of the characteristics of this era to acquaint himself with what's new and to educate oneself continuously to keep up with common social trends. This study produced results which corroborate the findings of ***Hsiao & Chen, (2012)*** who reported that mobile nurse information system had improved message exchange among health care professionals, facilitated patient communication and increased efficiency of patient care duties, increased the professional image of nursing, and improved overall performance in nursing practice.

In addition, it is concluded from the literature that a specific purpose of many medical mobile applications is to support clinical decision-making. For example, based on their functionality, some apps provide quick, easy access to evidence-based information pertaining to clinical algorithms helping clinicians understand and apply principles of disease diagnosis. Other apps help health care providers to identify appropriate laboratory and radiology tests based on patient symptoms, provide access to drug references and medical calculators ***(Mosa, Yoo & Sheets, 2012).***

Alerts assume a critical role in clinical day by day schedule. Failure to enough convey a life-threatening value remains a latent cause of adversarial patient outcome events. By utilizing alerts and reminders, warnings might be conveyed rapidly at whatever time and any place, this could prompt to quick remedial activities ***(Majeed, Stöhr&, Röhrig, 2012).*** With respect to the perceived smartphone technology usage for alerts and reminders, a highly significant difference was found in the studied sample mean scores regarding the use of a smartphone technology for alerts and reminders throughout the academic years. Where, the (400 level) students had gotten the highest mean scores than their counterparts. In the meantime, the (100 level) students had gotten the lowest mean score. This study produced results which corroborate the findings of ***Mihailidis, Krones, & Boger (2006)*** who found that smartphone technology usage mechanism were useful for alerts and reminders, and medication safety as perceived by the studied sample.

As indicated by ***Bassendowski et al., (2011); Hsiao & Chen, (2012); Morris & Maynard, (2010); Tapper, Quinn, & Brown, (2012),*** clinical decision support systems have been shown to improve clinical practice more effectively

than manual systems, and to increase the utilization of evidence-based practice by nurses. In terms of the perceived smartphone technology used for decision support, the results shown that there was a highly significant difference in the studied samples mean scores regarding the use of a smartphone technology for decision support. Where, the (500-level) students had gotten the highest mean scores than their counterparts. In the interim, the (100level) students had gotten the lowest mean score. In the same vein, ***Mihailidis, Krones, & Boger (2006)*** found that the smartphone technology mechanism were useful for decision-making support as perceived by the studied sample.

In terms of the perceived smartphone technology usage for clinical communication, the results revealed that there was a highly significant difference in the studied samples mean scores regarding the perceived smartphone technology used for clinical communication throughout the academic years. Where, the (200 level) students had gotten the highest mean scores than their counterparts. Meanwhile, the (100 level) students had gotten the lowest mean score. The literature review yielded that, smartphone technology may be attributed to perceived improvements in clinical communication, efficiency, and clinical skills (***Wu, et al, 2010***). It has been observed that increasing use of smartphone technology for clinical communication, possibly due to the lack of an existing secure and efficient hospital communication system (***Wu, et al, 2012***). In addition, the use of smartphone technology for communicating patient information ***(Robinson et al., 2013)***. Furthermore, laboratory results and radio-diagnostic interpretations could easily be communicated by a smartphone technology ***(Yeo et al., 2012).***

It is acknowledged in the literature that the use of smartphone technology applications would be the good supplement for nursing education. The smartphone technology provides a quick access to educational materials and guidelines during clinical, class and a panel discussion. With downloadable applications, subscriptions, and reference materials, they can be used to engage students and reinforce learning anytime and anywhere ***(Zhan, 2014).*** In addition, smartphone technology can easily be integrated into nursing curricula. Students can use the smartphone technology to refresh their knowledge on medications ***(Du, et al., 2013).*** Moreover, each healthcare provider is responsible to safeguard that applications meet the standards which essential for providing quality health care ***(Phillippi & Wyatt, 2011).***

As far as the perceived usage of a smartphone technology application, the results revealed in relation to (100 level) students that, less than half percentage of them was utilized medical calculators. Besides, more than third percentage of (200 level) students was utilized medical calculators. As for (300 level) students, less than half percentage of them was looking up medication, more than a third percentage was looking up nursing intervention/ care plans. As for (400 level) students, more than half percentage of them was looking up nursing intervention/ care plans, half percentage was looking up lab /diagnostic information. Finally, as for (500 level) students, more than half percentage of them was present lectures.

This may be due to the easiness of acquiring new technological skills through visual educational programs, which have become widely available on smartphone, and which allow their users to access the latest technologies. This study produced results which corroborate the findings of ***Moore and Jayewardene (2014)*** who found that, (72%) of nurses used smartphone technology to access textbooks a formularies, while (61%) of nurses used smartphone technology as calculators and clinical decision tools.

The world of work demands experts with a high level of critical thinking, imagination, the ability to respond to complex communication, continually invent new ideas, products and services for the global marketplace and demonstrate

the ability to work effectively and respectfully in diverse teams ***(Trilling & Fadel, 2009).*** As for the perceived usefulness of smartphone technology usage for developing creative thinking. It is found that the highest mean scores was recorded for the use of smartphone technology for developing creative thinking of 300 level students than their counterparts. There is a possible explanation for this result: that the students have a strong desire to abandon the traditional form of studying which they followed in high school, and have aspirations for more control over their learning at the university. This finding is in concurrence with ***Ramamuruthy, & Rao, (2015)*** who concluded that, smartphone technology use boosted learners' critical thinking, and creative thinking. As indicated by ***ACARA, (2013)*** creative thinking involves students in figuring out how to produce and apply new ideas. It incorporates accepting different viewpoints and possibilities and recognizing new relations.

Concerning the perceived usefulness of smartphone technology used for developing communication skills, a highly significant difference was found in the studied sample mean scores regarding the perceived usefulness of smartphone technology used for developing communication skills throughout the academic years. Where the (100 level) students had gotten the highest mean scores than their counterparts. Meanwhile the (400 level) students had gotten the lowest mean score. There are similarities between the current study results and those of ***Gikas, & Grant, (2013)*** who reported that, the studied sample felt that the constant communication made available through the smartphone technology was key in the success of the instruction and allowed them to be fully productive.

Collaborative skills, including establishing and building positive relationships, making responsible decisions, working effectively in teams, handling challenging situations constructively, and developing leadership skills ***(ACARA, 2013).*** With respect to the perceived usefulness of smartphone technology usage for fostering collaborative learning, the results revealed that there was a highly significant difference between mean scores of the perceived usefulness of smartphone technology usage for fostering the studied sample collaborative learning by academic year. Where the 500 level students had gotten the highest mean scores than their counterparts. Meanwhile the 100 level students had gotten the lowest mean score. According to ***Hoffman, (2009); Pang, (2009)*** smartphone technology provide learners opportunities to collaborate, discuss content with classmates and instructors, and create new meaning and understanding. There are similarities between the current study results and those of ***Batham, Jamieson-Proctor& Albion, (2014)*** who reported that learning activities by using smartphone technology was successful in separately developing creativity and collaboration among early learners.

As for the perceived usefulness of smartphone technology usage in promoting the autonomous learning, a highly significant difference was found in the studied samples mean scores regarding the perceived usefulness of smartphone technology usage in promoting autonomous learning throughout the academic years. Where, the (500 level) nursing students had gotten the highest mean scores than their counterparts'. Meanwhile the (200 level) students had gotten the lowest mean score. The reason behind this could be that the student might develop high competencies of self-directed learning through the utilization of smartphone technology for a long time. This finding is in agreement with ***Ramamuruthy, & Rao, study (2015)*** who concluded that learners have fairly moved forward to take up autonomy for their learning with the help of smart phones. Additionally, ***Ponto, (2011)*** concluded that educators must aim to provide a safe the learning environment which is satisfying, promotes autonomous functioning and encourages self-governance and personal development for students, as only then will nursing become truly autonomous profession.

As for the perceived usefulness of smartphone technology usage in promoting learner satisfaction, a highly significant difference was found in the studied sample mean scores regarding the perceived usefulness of smartphone technology usage in promoting satisfaction. Where the (400 level) students had gotten the highest mean scores than their counterparts. Meanwhile the (100 level) students had gotten the lowest mean score. This finding is in concurrence with ***Ramamuruthy, & Rao, (2015)*** who reported that learners were moderately satisfied when they use smart phones for their learning purpose. The process of learning gets easier when the learners get quick access to additional resources while they are learning in the classrooms. Henceforth, it can be concluded that, smartphone technology use boosted learners' critical thinking, creative thinking, and collaboration skills. In spite of the fact that learners have moved toward self-ruling learning, they are still dependent on the instructors to accomplish their learning objectives.

Despite what might be expected, the results shown that close to three-fourth percentage of (100level) of male students used smartphone technology infrequently than their counterparts, over half of (300 level) female students used smartphone technology infrequently, three-fourth percentage of (500 level) male students used smartphone technology occasionally, Furthermore, near three-fourth percentage of (400 level) male used smartphone technology occasionally. This result has been unable to support the findings of ***Kibona, & Mgaya, (2015)*** who reported that female students (57%) use smartphone technology more than male students. Also, as it is demonstrated by the survey done by ***Economides & Grousopoulou, (2008),*** gender differences exist, but they are not big. Females appear to make more phone calls than male. Moreover, they take more photos and record more.

With respect to the perceived effectiveness of the smartphone technology usage, the results shown that, about third percentage of (100 level) students', less than half percentage of 200 level students, less than half percentage of (300 level), and less than half percentage of 400level students said that the smartphone technology may prompt to risk of cross-infection. This study produced results which support the findings of ***Al-Abdalall (2010)*** who conducted a study in Ireland to test the bacteria carrying potentials of smartphone showed that (70%) of smartphone, tested for bacteria that could cause infection, 96% were contaminated and (15%) had bacteria known to cause health care associated infections. Also ***Hassoun et al, (2004); Braddy & Blair, (2005)*** showed that smartphone technology, which used in health care settings could entail a high level of contamination.

Furthermore, less than half percentage of 400level and 500level students stated that the smartphone technology was distracting. As revealed in the literature that the distractions and interruptions consist of anything that disrupts an individual from the current task by diverting one's attention. Sources for interruptions and distractions include noise, other people, or electronic gadgets (***Magrabi, Li, Dunn & Coeira, 2011).*** This finding supports earlier research of ***McBride& Deborah (2015)*** who concluded that distractions by personal communication gadgets in the healthcare field are of increasing importance in the endeavor to make healthcare safer.

Smartphone technology, are known to be detrimental to cognitive performance. Their use increases reaction time, reduces focus, and lowers the performance of tasks needing mental concentration and decision making ***(Gill, Kamath, & Tejkaran, 2012).*** When looking at the perceived usage of smartphone technology levels in relation to the studied sample self-reported academic performance. The findings shown that the studied sample in all academic years who infrequently utilized smart phone by were lower achievers, where near half of 100 level students, had gotten (D) level, Above third percentage of 200 level students had gotten (D) level, More than half percentage of 300 level students had

gotten (C) level, More than half percentage of 400 level students had gotten (c) level, half percentage of 500 level students had gotten (D) level and half percentage of 500 level students had gotten (C) level.

As for the frequently utilized smart phone by the studied sample throughout the academic years, the finding indicated that more than half percentage of (100 level) students, had gotten (B), above three-fourth percentage of (200 level) students, had gotten (D) level. Half percentage of (300 level) students, had gotten (D) level, All of the (400 level) students, had gotten (D), above three-fourth percentage of (500 level) students had gotten (D) level in the last academic performance. In addition, a significant difference was found between the smart phone technology usage levels and the studied sample self-reported on academic performance throughout the academic years. It is hard to clarify this result, however, it may be correlated with the personal variables, such as motivational level, study habits and time management ability might be influencing the studied sample academic performance. A more productive way to handle these concerns is to conduct empirical research to decide to what degree these elements could be contrarily affect the academic performance of nursing students.

Nevertheless, the findings of the current study do not support the earlier study of ***Marcos, Hilea, Barchino, Jiménez, & Martine, (2010)*** who was conducting a study titled "The impact of mobile technology on academic performance in high school and college levels", **Marcos et al**. concluded that this gadget has a great influence on learning performance of both. In contrast to earlier findings of ***Machin et al. (2007),*** who found that the smartphone technology had a positive impact on student grade point average (GPA). Likewise, ***Fryer (2013)*** found that, there were no measureable change test scores. Additionally, the findings of the current study do not support the previous research of ***Beland, & Murphy, (2015)*** who observed that using smartphone technology enhances the results for the low-achieving students and has no significant impact on high achievers. The results suggest that low-achieving students are more likely to be distracted by the presence of smartphone technology, while high achievers can focus in the classroom regardless of whether smartphone technology are present. Moreover, ***Jacobsen & Forste (2011)*** recognized a negative relationship between smartphone technology usage and self-reported grade point average (GPA) among university students in the United States.

CONCLUSIONS

Nevertheless, what might be expected, each smartphone technology application has been used eventually by the low rate of the studied samples throughout the academic years. Additionally, both genders used the smartphone technology infrequently, particularly freshman students and the utilization, upgraded gradually from both genders according their progression over their academic year. Contrary to popular belief, the studied sample who infrequently used smart phone throughout the academic years had gotten the lesser score in their studies (GPA). So, this study have been clearly revealed that smartphone technology as a learning tool can help students to achieve or perform well their studies, but at the same time, smartphone technology as learning tool might be hindering the nursing students from getting the deserved score in their studies (GPA).

RECOMMENDATIONS

Based on the Findings of the Current Study, the Following Recommendations were Deduced

- The scholarly staff should create specific strategies for using smartphone technology such as guidelines for taking pictures and videos during lectures or clinical practices, sharing information on social networks, use of

smartphone technology during clinical practices, use of sterilized pouches to store smart devices during patient-care, use of gloves, to be changed if smartphone technology is used.

- Raising the awareness of the scholarly staff and students about the advantages and moral and lawful risks of smartphone technology utilization in the educational organizations.
- Smartphone technology learning ought to be formally consolidated into the educational programs.
- Nursing educators ought to design educational methods, activities, and material that are appropriate for smartphone technology
- College administration ought to collaborate with network service providers to lessen the cost of internet subscription to both students and staff that will empower their consistent utilization of smartphone technology to support their looking for medical and health information.
- For the student academic performance to be enhanced, a few limitations needed be made with the utilization of smartphone technology for social activities in the academic environment.
- The current study findings provide the following insights for future research, it would be interesting to replicate the study with registered nurses working in target specialty units, to identify the different cultural values that may impact how students use their smartphone technology for academic information seeking

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