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Lawal, Umar Bello and Elshafie, IKbal Fathalla and Yunusa, Umar and Ladan, Muhammad Awwal and Suberu, Ahmed and Abdullahi, Saratu G. and Mba, Chioma Judith (2017) Utilization of information and communication technology among undergraduate nursing students in Tanta university, Egypt. *International Journal of Nursing & Care* . pp. 1-8. ISSN 2573-8879 (In Press)

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## Utilization of Information and Communication Technology among Undergraduate Nursing Students in Tanta University, Egypt

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Received: 06 July 2017; Accepted: 21 July 2017

**Citation:** Umar Lawal Bello, IKbal Fathalla Elshafie, Umar Yunusa, et al. Utilization of Information and Communication Technology among Undergraduate Nursing Students in Tanta University, Egypt. Int J Nur Care. 2017; 1(3): 1-8.

### ABSTRACT

*The use of ICT to enhance learning and teaching has become increasingly important. Information and communication technology in education is a modern, efficient and cost-effective process which has created a need to transform how students and teachers from higher institutions learn and teach respectively. This study was conducted to assess the pattern and utilization of Information and Communication Technology among undergraduate Nursing students in Tanta University, Egypt. A descriptive cross sectional design was used for the study where 504 fourth year students enrolled in the 2015/2016 session participated in the study. A validated structured questionnaire was used for data collection. The data collected were analyzed using Statistical Package for Social Science (SPSS) version 20. The results indicated that 80% of the surveyed students utilized ICT in performing their study assignments and research. Majority of the female students (79.0%) self-reported themselves as good in computer skills while only one fifth (21.0%) of the male students rated themselves as good in computer skills. Students whose parents had secondary education and above had their total score in self-rating of computer operation skills as significantly higher than those whose parents had below secondary education. The study concluded that majority of the students had good ICT utilization with variation to residence and family income. It is therefore recommended that the university should ensure strict compliance with the rules of e-learning courses for the students and ensure proper application by each student.*

### Keywords

Utilization, Pattern, Information, Communication, Technology.

### Introduction

The use of Information and Communication Technology (ICT) has steadily increased in all life spheres, including economic, social, political and cultural, as well as in the health care delivery system. The gradual introduction and advance extensive utilization of such technological inventions as personal computers, cell phones and internet has impacted every aspect of life, making it incredible to provide services or even function without them [1]. In the health care sector, especially with the recent general shift to outpatient care, ICT usage has become essential in decentralized health care provision [2]. However, since the introduction of digital technology

into health care, nurses have been often in opposition, arguing that use of computerized systems prevents them from capturing “the real nursing”, distances nurses from patients and interrupt the relationship. Multiple technical problems also negatively affect the acceptance of new technologies. One reason for this might be that the ICT based systems used in health care are seldom designed with nurses’ active participation and thus it may seem that the nurses are serving the system, not the system serves the nurses’ needs [3-5].

The use of ICT to enhance or support learning and teaching has become increasingly important in education [6]. Information and communication technology in education is a modern, efficient and cost-effective process and has created a need to transform how

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students and teachers from higher institutions learn and teaches respectively [7]. Compared with developed countries, the use of ICT in education programs in developing nations is relatively limited. Some of the reasons mentioned for such gaps are because developing countries face shortages of financial resources, limited internet access, lack of trained teachers and the lack of proper policies (citation needed). Nevertheless, there has been growing interest in the use of ICT in educational settings in developing countries. Furthermore, in recent years, several countries have attempted governmental initiatives to expand access to ICT in higher institutions and faculties. These initiatives have often been associated with a broader educational quality improvement agenda [8].

The traditional delivery system for higher education has been a classroom setting with a teacher giving a lecture and students listening and writing notes. A face-to-face interaction between the teacher and students has been seen as an essential learning element within the learning environment. The explosive development in information and communication technology challenged the traditional model by offering unlimited opportunities in the educational systems in general and in higher education institutions in particular. It permits the designing and production of e-courses, it is claimed that students can learn more from e-learning than through traditional classroom methods, perhaps because students become more involved in the learning process through interactivity (citation needed). Flexibility is a key characteristic of e-learning, since it promotes learner autonomy and learner choice about how, when and where to study. However, the new approach of learning is not free of challenges [9].

To be eligible in the e-learning, both the educator and the learner are expected to be familiar with using the Web, chatting over the internet, mastering the learning management system (LMS) applications, and possessing the capacity to collaborate with others [10]. E-learning environments should be designed to support collaborative learning. The online assignment submission and online assessment are an indispensable part of the e-learning environment. Collaborative study presents new opportunities and challenges, both in terms of separating the process and product of collaboration, and in the support of skills development [11]. Collaboration with lecturers and colleges provides learners with opportunities to test and defend their own views, as well as enrich and expand their understanding by examining the views of others (12). The e-learning setting is designed such that learners are given an opportunity to decide what to learn, encouraged to interact with peers and educators, and given the appropriate support. The concept of self-learning is grounded in the belief that student learning is more effective when it occurs within the context of realistic experience, and if learners understand the reasons for learning [13].

The move to e-learning is closely linked to the adoption of electronic patient records. Currently, the complex issues surrounding computer literacy and information literacy are hindering the advancement of both nursing students and nurses

working with electronic health records. The findings of recent studies revealed that staffing issues, pedagogically sound delivery models and training of both educators and students could not be treated as trivial issues as they are critical to the success of e-learning. Globally, E-learning has been introduced to nursing curricula in a number of Western countries including Australia, Canada, Greece, Ireland, New Zealand, UK and USA. E-learning has been expanded to the Arab and African countries such as Egypt and Nigeria [14].

E-learning in Egypt could provide solutions to problems such as overcrowded classrooms and transportation problems. The adoption of e-learning in Egypt can provide an economic and more suitable solution to the higher education problem by filling in the gap between the number of university places available in Egypt and the growing demand for higher education. The Egyptian Ministry of Higher Education has made its first attempt in collaboration with higher education institutions in Italy, Canada and the United States to launch Egypt's first electronic non-profit university [15]. The National E-learning Center was established within the Supreme Council of Universities to support the development of e-learning in Egypt through adopting standards for course development, provides support to universities in the form of infrastructures, information, tools and training programs (NELC 2006) [16]. Regarding the Internet initiative, the Ministry of Communications and Information Technology has been maintaining a free internet access nationwide since 2002, where more than 15,000 ports serving 2 million internet users, with users paying only for local phone tariffs [17].

In 2005, Tanta University E-learning Center was established to promote and encourage excellence in learning by providing the expertise and supporting the faculties at the university level. Tanta University is one of the Egyptian universities that have powerful network infrastructure and also use ICT in education. E-learning has been positioned as a 'revolution in education', it is a vital tool for developing the skills needed for future practitioners and an excellent method for enhancing lifelong learning. As nursing is a high-demand field with highly specific needs for the students, thus the researchers designed several nursing electronic course at Faculty of Nursing-Tanta University, Egypt. Community health nursing is considered the first electronic nursing course at Faculty of Nursing-Tanta University. Community health nursing electronic course is considered the first among all Egyptian universities and the first electronic course in all faculties of Tanta University. As the students are the core of the learning process and supporting the argument that learners are experts in their own experiences so the first e-curriculum experience cannot be ignored [18,19].

Researchers in nursing should plan to study the impacts of using technology. Assessment of user satisfaction, clinical outcomes and financial impacts are the most widely studied aspect but there is little consistency in the methods or measures. This limits the ability to synthesize findings to determine the best practices in the use of ICT in planning, implementation and evaluation [20]. The design of a research study, including the choice of specific research

method, is always driven by the research question. At the design stage the researcher determines whether the study will be qualitative or quantitative, data collection tools, the types of analysis that will be carried out on data to answer the research question. Computers and databases in this stage can be used to search the literature for instruments that have already been developed [21].

Nurse researchers use ICT when many studies are conducted on a topic such as combining findings to an integrative review or meta-analysis or systematic review. The researcher located randomized control trials or other forms of researches by searching for Medline, Embase, Cancerlit, CINAHL and Cochran Library. The skills needed to find research reports and read and critique them for use in practice begin in a nurse's basic educational program and ICT competency skills [22].

## Methodology

### Research Design and Tool for Data Collection

A descriptive cross sectional design was used for the study. The tool used for data collection in this study was a validated structured questionnaire developed by the researchers based on relevant literatures reviewed [23-26]. It comprised two sections: Section A, covers socio-demographic characteristic of the students while Section B, covers utilization and pattern of information and communication technology.

### Setting

This study was conducted in Faculty of Nursing, Tanta University, Egypt.

Tanta University is an Egyptian university in the city of Tanta, Al Gharbiyah governorate, Egypt. The university is under the direct scientific supervision of the Ministry of Higher Education. It was founded first in 1962 as a branch from the University of Alexandria with the faculty of Medicine only and then it became an independent university named University of the Middle Delta in 1972. It had at that time Medicine, Science, Agriculture and Education faculties. Then, its name was changed into Tanta University in 1973. The university's branch in Kafr As shaik was constituted in 1983. In 1976, the ministerial decree No. 642 was issued in order to identify Tanta University faculties and institutions including Higher Institute of Nursing. Then the presidential decree No. 200 was issued in 2000 to turn nursing institutions in Egyptian universities to independent colleges in which period of study lasts for 4 years qualifying students to be graduated with a bachelor degree of nursing. Later the internal bylaw of the faculty of Nursing was issued upon the ministerial decree No.966 on 9th July 2000 [27].

### Participants

All the nursing students at 4th year, who enrolled in the academic year 2015/2016, were included in the study. Their number was 600 students. The response rate was 84%, (504 students) were involved in the study.

### Sample Size and Sampling Technique

A purposive sampling technique was used where all the final year

(4th Year) students were used for the study. A sample size of 600 was used with 84% response rate.

### Inclusion Criteria

Only 4th year students were included in this study. This was because e-learning courses and nursing informatics courses were only offered at 4th year of the undergraduate studies.

### The pilot study

A pilot study was carried out on 60 students to test the clarity and applicability of the tool, to estimate the length of time needed to fulfil data collection from each student as well as to identify any obstacle or problems in data collection. These 60 students were not included in the study sample and all the necessary modifications were made according to the pilot findings. The tool was tested for reliability and content validity, the Cronbach's alpha value was 0.8.

### Ethical and legal considerations

- Before conducting the study, official permission was obtained from the Faculty of Nursing research and ethical committee.
- An informed consent for participation in the study was obtained from the entire sample.
- The study was not expected to cause any harm and/or pain to the entire sample.
- Confidentiality and privacy was considered regarding the data collected.

### Data analysis

The data collected were analysed using Statistical Package for Social Science (SPSS) version 20.

## Results

The result of this study as indicated by Table 1 showed the distribution of the students regarding their socio-demographic characteristics. The table indicated that the mean age of the respondent was  $21.45 \pm 0.69$  years. The table also illustrated that the majority (83.5%) of the respondents were females. Regarding the fathers' education, the table showed that about two fifth of them (41.1%) had secondary education and slightly more than one thirds (35.5%) had university education and above. Regarding the Mothers' education, about half (48.5%) of them had secondary education and only 20.4% had university education and above. Concerning the fathers' occupation, 46.0% were employees while 65.3% of the respondents' mothers were housewives. The table also revealed that 53.0% of the study sample had enough and saving with respect to the family income and 61.3% lived in the rural area.

Table 2 showed the distribution of the respondents according to their actual utilization of ICT and its devices. The table revealed that the majority (93.3% and 91.5%) of the sample used a computer/ laptop and internet respectively. With regards to the number of e-learning courses taken by the respondents, 35.3% have taken one course, 65.9% of the respondents participated on e-learning courses when answering exams while 34.9% were involved in an online forum participation, while 61.7% used smart phones with

internet access. About three quarters (74.8%) of them have an email account. Those who had access to medical journals or online organisation were 28.8% of the studied students.

In relation to the number of internet access, the same table revealed that slightly more than half (55.0%) of the students accessed the internet 1-3 times per day and 28.2% of them accessed it more than 3 times per day. About half (52.6%) of the respondents spent 1-3 hours on the internet per day with mean  $\pm$  SD of 4.19 $\pm$ 2.40. In addition, 43.7% of the students reported that they used computer/ internet just one time/week for scientific knowledge search compared to only 13.8% of them who used it 4 times and more/ week.

Socio-demographic characteristics		(n=504)	
		n	%
Age in years	20	19	3.8
	21	276	54.8
	22	172	34.1
	23 and above	37	7.3
	Range	20-24	
	Mean $\pm$ SD	21.45 $\pm$ 0.69	
Sex	Males	83	16.5
	Females	421	83.5
Fathers' education	Illiterate, read & write	60	11.9
	Elementary education	58	11.5
	Secondary education	207	41.1
	University education & above	179	35.5
Mothers' education	Illiterate, read & write	112	22.2
	Elementary education	44	8.7
	Secondary education	245	48.5
	University education & above	103	20.4
Fathers' occupation	Professionals	111	22.0
	Employees	232	46.0
	Technical	15	3.0
	Workers	50	9.9
	Farmers	48	9.5
	Private work	48	9.5
Mothers' occupation	Housewives	329	65.3
	Professionals	85	16.9
	Employees	73	14.5
	Workers	7	1.4
	Farmers	6	1.2
	Private work	4	0.8
Family income	Enough and save	267	53.0
	Just enough	213	42.3
	Not enough	24	4.8
Place of residence	Rural	309	61.3
	Urban	195	38.7

**Table 1:** Distribution of the respondents regarding their socio-demographic characteristic.

Utilization Variables		(n=504)	
		n	%
Current Use of computer/laptop		470	93.3
Current Use of internet		461	91.5
Number of E-learning courses taken in the faculty	One (1)	178	35.3
	Two (2)	172	34.1
	Three (3) & above	154	30.6
Type of E-learning participation	Answering Exams	332	65.9
	Sending home work	71	14.1
	Studying courses	73	14.5
	Others	28	5.6
Online forum participation		176	34.9
Use of smart phone with internet access		311	61.7
Having a functional email account		377	74.8
Access to medical journal/organisation online		145	28.8
Use of internet for	Seminar preparation	282	56.0
	Research	403	80.0
	General information	311	61.7
	Mails	229	45.4
	Social media	311	61.7
	Films/news	312	61.9
	Games	258	51.2
	Number of internet access	Once and more/week	38
Number of internet access	None at all	47	9.3
	1-3 times daily	277	55.0
	> 3 times/day	142	28.2
Average number of hours on computer/internet per day	1-3 Hours	265	52.6
	4-6 Hours	111	22.0
	7 and above	128	25.4
<b>Mean <math>\pm</math> SD = 4.19 <math>\pm</math> 2.40</b>			
Number of computer/ internet use for scientific knowledge search	None	101	20.0
	Once/ week	220	43.7
	2-3 times/week	115	22.8
	4 & above/week	68	13.5
<b>Mean <math>\pm</math> SD = 2.37 <math>\pm</math> 1.09</b>			

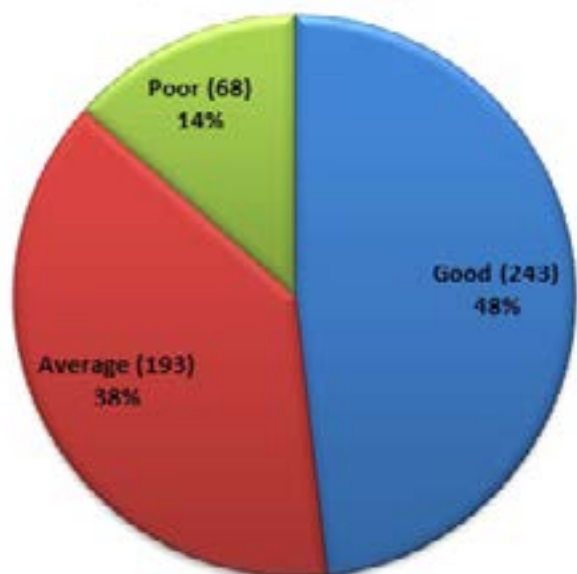
**Table 2:** Distribution of the respondents according to utilization of ICT and its devices.

Figure 1 showed the distribution of the students according to their total self-rating score of computer operation skills. The figure showed that about half (48.0%) of the students reported that they had good skills in computer operations while 38.0% indicated average skills compared to only 14.0% of them who had poor skills.

Table 3 showed the relationship between students' total self-rating score for computer operations and their socio-demographic characteristics. It was obvious that there was high statistical significant relationship between total self-rating score of computer operations and all socio demographic variables ( $P < 0.05$ ) except for mothers' education and occupation ( $P > 0.05$ ).



**Distribution of total self rating score of computer operation by the respondents**



**Figure 1:** Distribution of the respondents according to total self-rating score of computer operation skills.

Socio-demographic characteristics variables		Total Self-rating score						X <sup>2</sup>	P
		Good (n=243)		Average (n=193)		Poor (n=68)			
		no	%	no	%	no	%		
Sex	Male	51	21.0	23	11.9	9	13.2	7.031	0.030*
	Female	192	79.0	170	88.1	59	86.8		
Fathers' education	Below secondary	45	18.5	48	24.9	25	36.8	10.236	0.006*
	Secondary and above	198	81.5	145	75.1	43	63.2		
Mothers' education	Below secondary	76	31.3	54	28.0	26	38.2	2.488	0.288
	Secondary and above	167	69.0	139	72.0	42	61.8		
Fathers' occupation	Professional & semi-professional	181	74.5	128	66.3	34	50.0	15.085	0.001*
	Other occupations	62	25.5	65	33.7	34	50.0		
Mothers' occupation	Housewives	154	63.4	128	66.3	47	69.1	0.923	0.630
	Working mothers	89	36.6	65	33.7	21	30.9		
Family income	Enough and save	143	58.8	96	49.7	28	41.2	7.974	0.019*
	Just enough & not enough	100	41.2	97	50.3	40	58.8		
Residence	Rural	160	65.8	145	75.1	54	79.4	7.094	0.029*
	Urban	83	34.2	48	24.9	14	20.6		

**Table 3:** Relationship between students' total score of self-rating of computer operations and socio-demographic characteristics variables. \*Significant (P<0.05).

## Discussion

Findings of the study revealed that majority of the students were females within the age range of 20-24 years (Table 1). This may be due to the setting of this study where most of the students were females in the faculty of nursing. This study also revealed that about three quarters of the students' fathers and two thirds of their mothers had secondary education and above (Table 1). This parents' level of education may influence positively the students' use of ICT. The majority of the students' fathers were either professionals or employees while most of their mothers' were housewives, which is the custom of Egyptian women in rural area. This study also showed that about one half of the students reported that their family income was enough and can save while almost two thirds of them resided in the rural areas. This finding may be due to the location of Tanta University in the agricultural zone of Egypt.

Studies over the past decade indicated a remarkable change in utilization pattern of information and communication technology amongst medical and nursing students. Earlier it was used for mails, chats, movies, videos, games, dictionaries and entertainment; but it now has expanded prospects rapidly by e-books, science apps, readymade power-point presentations, evidence based nursing, Wikipedia etc. The rapid development leading to enhanced medical and nursing literature retrieval applications, together with increased access to personal computers have changed both the study and practice settings in health professions [28-30]. With regards to the utilization of ICT by students, the present study revealed that the majority of the sample used a computer/laptop and internet network (Table 2). This result may be attributed to the university policies that enforce all students to pass ICDL courses, which in turn enable them to use computer and internet. This result is in agreement with the findings of Bhatti and Javed [31], in a study to determine the experience of internet utilization by post graduate medical students in Pakistan, they stated that almost all of the respondents used internet except only one respondent. This is also in agreement with Taiwo et al. [32], in their study of ICT knowledge, utilization and perception among healthcare providers at national hospital Abuja Nigeria, they stated that "on ICT utilization, the vast majority of participants have used computer (95.0%) and the internet (93.6%) for more than three years".

The present study revealed that all the students have been exposed to the experience of taking e-learning courses by varying degrees; as more than one third (Table 2) of the students stated that they have taken e-learning courses just once in the faculty, while another one third have taken it two times only but only less than one thirds again stated that they have taken e-learning courses three times and above in the faculty. This experience indicated that all the students had previous mandatory training by the University e-learning center on courses and ICT facilities, this assertion by the students may be due to the large number of students in the faculty where students are grouped into various categories during the e-learning courses. Therefore, while some students took the courses three times or more, others took it just twice but the next round of the course would be the group with less number of

e-learning participation. It may also be attributed to the variation in previous e-courses interaction among students. Regarding the type of e-learning participation in the faculty, the present study revealed that about two thirds of the students participated in answering examinations using e-learning, only few percentages of students used e-learning to send home work and study courses online (Table 2). These findings may be due to the facts that e-learning courses participations are mandatory to all undergraduate students as the semester work assessment involves how the students use & interact with e-courses.

With respect to the reasons or purposes for internet use, this study revealed that the majority of the students used the internet for research purposes (Table 2), this result could be attributed to the nature of this study as it is conducted in the faculty where research and literature search are the common self-directed learning among student to abreast themselves with the current knowledge. It could also be attributed to the nature of nursing courses and semester work that compel students for assignment search via online sites. In addition, students should upload assignments and semester work to teacher via e-mails as reported by slightly less than half of them (table 2). Also, it was evident that slightly less than two thirds of the student used the internet for accessing general knowledge, social media such as facebook and for films and news respectively. Almost one half of the students used the internet for sending/receiving email and slightly more than half of them used the internet for games. These findings are in accordance with the findings of Bhatti and Javed [31], they stated that the majority of the participants revealed that they always use internet for their education purpose. They mentioned that they frequently use it for research, for up to date information, to obtain information about health and entertainment purposes. They sometimes used it for internet surfing, general information, sports information and news.

Concerning the number of internet access, this study revealed that more than half of the students' accessed internet 1-3 times daily (Table 2). This finding may be due to the academic commitments the students were subjected to, that enforced them to surf the internet for research and scientific nursing knowledge search as they mentioned (Table 2). The findings of Jadoon, et al. in a study for evaluation of internet access and utilization by medical students in Lahore, Pakistan, revealed that the students surveyed were using internet with various frequencies, most of the students reported occasional use of internet [33]. On the average number of hours on computer/internet per day, the present study revealed that about half of the students spent 1-3 hours per day with a mean and standard deviation of 4.19hours and SDof 2.40. This result may be justified by students' use of internet for social communication plus the scientific and general Knowledge search. This finding is in agreement with the finding of Karaman, who studied nurses' perceptions of online continuing education, and stated that 40% of the nurses were operating computer for 1-3 hours per day [34].

This study also revealed that only one third of the students participated in online forum, this may perhaps be due to faculty online forum participation was optional to the students. Nearly two

thirds of the respondents used smart phone with internet access, about three quarters of them had an email account, but only one quarter had International Computer Driving Licence (ICDL) and access to medical journals online. These findings may be due to the facts that smart phones are used for social media such as facebook, twitter etc, all smart phones required the user to create and email or Google mail account at the initial set up, hence the high percentages of students with email account. This finding is in agreement with the findings of Taiwo et al. they stated that 95.9% of the respondents possessed a functional e-mail address [32].

Some selected computer operations skills and competencies for nurses and students includes computerized searches and retrieving patient's information, the use of telecommunication devices, documentation of patient care activities, the use of information technologies for improving nursing care services, and the use of networks/internet and computer technology safely [35]. The present study also revealed that about half of the students reported that they had good skills in computer operations when total self-rating score was considered (Figure 1). This is quite different from the finding of a similar study conducted among health science students at the University of Gondar, North Western Ethiopia by Woreta, et al. where only 32.4% of the students reported good/very good self-rated IT skills [36]. This may be attributed to the availability of ICT devices to the students in this study.

It was obvious from the findings of this study that students whose fathers had secondary education and above, had total self-rating score significantly higher than those whose fathers had below secondary education. Also, students from educated mothers rated themselves as having good abilities in computer operations but with no significant relationship. This was also true for students whose fathers were professionals or semi-professionals (Table 3), This reflects the effect of parents' educational levels on the students skills. Students who had enough family income reported total self-rating score significantly higher than those who had low family income. This may probably be related to availability of ICT facilities at home. This connections between students' self-rating score of computer operations and their parents' educational level and occupation may be due to the fact that educated parents always tries to share knowledge with their children, so also professionals always use ICT devices in providing their professional duties and therefore they trained their children on how to use these ICT devices, likewise the children tries to copy their parents skills. Meanwhile, rural students' total self-rating score was significantly higher than that of urban students. This is surprising as more challenges in using ICT devices were expected from rural students.

## Conclusion and Recommendation

From this study, it can be concluded that majority of the students passed through the experience of e-learning courses. The majority of the students utilized ICT in performing their study assignments and research, most of them used smart phones with internet access and had e-mail account. Female students significantly rated themselves as good in computer skills higher than males. Students whose parents had secondary education and above, their total score

in self-rating of their computer operation skills was significantly higher than those whose parents had below secondary education. Therefore, based on the findings of this study, it is recommended that the level of computer literacy and competency in ICT skills use should be enhanced by integrating ICT courses into the curriculum of undergraduate students and by developing positive attitude towards the application of ICT by all the faculty members. The faculty should ensure strict compliance with the rules of e-learning courses for the students and ensure proper application by each student. Students should be encouraged to use ICT for academic purposes such as research and assignments rather than predominantly social reasons.

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