COMPUTER APPLICATION USE AND ITS RELATIONSHIP TO STUDENTS' DIFFERENCES: SURVEY OF A PUBLIC UNIVERSITY IN GHANA

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ABSTRACT

The current study sought to identify whether there were differences among university students in the use of three software applications based on gender, age and programme of study in order to inform teachers of the Information and Communication Technology on the entry behaviour dynamics of their students. With 1000 university students sampled in one of the public universities in Ghana, the researcher found that 96.3% of the students had interest in learning the various technology applications. Second, there was a significant difference between male and female university students in terms of their knowledge in the use of Windows management, Power Point, and emailing. Third, the level of knowledge in the three variables of university students were not the same. However, the study did not find any evidence of differences in terms of age as well as the programme of study. The implications for practice have been discussed.

Keywords: University Students, Gender, Power Point, Emailing.

INTRODUCTION

Countries around the world are making serious efforts to make sure the citizenry has a good grasp of the use of various technological applications regardless of the differences among them. In our schools and institutions, industry as well as service providers continue to provide the technological education, seminars, and professional development programmes for employees with the view of equipping them with the necessary technological application knowledge to remain relevant in the 21st century. Meanwhile, there are certain foundational and frequently used applications that students should be conversant with them. On the contrary, there is inadequate effort to consciously imbue our students with these technological skills at the schools and institutions level where the basic technology training is given. When the right foundational knowledge in computer applications is given, it equips and motivates students to later excel in wherever they might find themselves on the job.

Technology Use by Gender

Technology has been regarded as an innovation that is used by both males and females in all walks of life. Nonetheless, many researchers have developed an interest in knowing the relationship between the use of technology and gender. Though ICT has been noted as one of the major forces that spark major revolution in human civilization. Moghaddam (2010) argued that such civilization has not been able to influence all humanity. He further elaborated by saying "these technologies are not gender neutral". He considered technology as a social product that has been usually perceived by society to be for as men. To further elaborate this, Wajcman (as cited in Fomsi & Emeka, 2017), observed elsewhere that a countless number of women have the perception that technology from the Western side symbolises male-controlled values. Therefore, many women are unwilling to venture into technology because it is considered to be a career for men.

A study conducted among Ghanaian students in ICT use indicated that 'male students were significantly less likely to utilize ICT than their female colleagues for purposes of academics and non- academics (Mensah, 2017). The disparity in knowledge regarding ICT is considered to have existed between males and females distance learners. Miliszewska and Sztendur (2010) identified in their study that there exists knowledge difference between male and female students with regard to ICT. These researchers reported a significant difference between males and females in terms of the use of digital tools in ICT. Vázquez-Cano, Meneses and García-Garzón, (2017) analyzed the differences in basic digital competences of male and female university students on Social Education, Social Work, and Pedagogy courses. The study was carried out at two public universities in Spain on a sample of 923 students. The findings indicated that males had a higher perceived competence in digital cartography and online presentations than females.

Shashaani (1997) studied the attitudes and experiences of university students towards the use of computers. With a sample size of 202, the researcher reported that females were less interested and less confident in learning to use computers as compared to their male counterparts. The study further added that whether university students would have an interest in learning how to use computers was partly based on their prior experience with the device before enrollment at the university. In a similar study at the senior high school level to identify whether there was a difference in gender in terms of the use of computers with a sample of 1730 respondents, the researcher once again reported that there was a significant difference between males and females. Male students had advanced knowledge in the use of computers than the females

In contrast, there have been other studies that found no evidence in terms of the use of technology between males and females. A survey was conducted at the University of Ghana among 154 university students. The study revealed that there was no significant difference in males and females in terms of ICT tools. The independent samples t-test indicated that $t(154) = 1.252$, $p = 0.37$. The researcher categorically stated that "inherent opportunities and benefits such as collaboration with other academics, data management, ensuring accuracy, teaching, learning, and research" were the reasons for the 'no significant difference' identified between males and females with regard to ICT usage (Owusu-ansah, 2013).

Similar findings were also indicated in India when a study was conducted to investigate the gender difference towards ICT awareness in various universities located in Punjab and Haryana states of India. The study involved nine hundred and four (904) respondents comprising of students and faculty members. Findings showed that there was no statistical difference between males and females towards ICT awareness (Verma & Dahiya, 2016). Females and males were thought to have differed significantly in ICT knowledge, skills, and applications. According to outcomes from research conducted in 2014, it was noted that males had a higher ICT knowledge and skills in the use of applications than their female counterparts (Mustafa, 2014).

Technology Use by programme

According to a research conducted in the United States of America to determine gender differences in college students' perceptions of technology-related jobs in computer science has indicated that there exists a significant difference between males and female in the use of ICT. A questionnaire was used to solicit responses from 184 students on issues of value, interests and expectations for success. Findings indicated that females have low value and interest in pursuing advanced studies in computer technology as well as the expectation for success in computer technology than their male colleagues (Appianing & Eck, 2015).

In 2010 two researchers studied the perceptions of secondary school girls regarding their interest in ICT studies as well them considering pursuing it as a career alternative. The research was carried out in the Western suburbs of Melbourne, Australia where the participants were from homes with low socio-economic status. The findings of the study revealed that these girls from low socio-economic background exhibited a positive attitude towards computer use and ICT. They have also indicated a high level of interest and self-efficacy in computing skills. Despite this secondary school girls with high interest and self-efficacy in ICT did not desire to consider studying ICT as a career option or for further studies. In terms of ranking female secondary students ranked ICT in the eighth place. They would consider other career options in Creative Arts or Health or those in society and culture or education to ICT (Miliszewska & Sztendur, 2010).

Technology use by Age

The debate on the impact of age on technology literacy has been unending. There have been different studies on either side of the coin that seems to suggest the impact of age on technology use and otherwise. Two researchers in Hong Kong used questionnaires to solicit information from 211 university students concerning their confidence in the use of technology in learning. They analysed their data using Bivariate and ANOVA. The outcome of the study indicated that older students had more confidence in using technology than younger students. The authors then explained that the older generation were mainly students that enrolled in a part-time mode of study whilst the younger students were studying full time. The authors predicted that older students probably might be using technology for their job hence could possibly derive their confidence through that. On the other side, younger students might have less chance to use technology in their studying environment and probably were only asked to use technology within the confines of school only. Thus, they practice less with technology resulting in less confidence when using technology for learning (Yau & Cheng, 2012).

Findings have indicated that younger students' use of ICT is less as compared to older students. A study conducted within Southern Cross University at Australia using online questionnaires to acquire data from first year students from different courses has significantly suggested that youngest students tend to have the lowest craving to use ICT for academic purposes (Ellis & Newton, 2009). Also, Bervell *et al.*, (2013) found that older teachers had more experience working with computer technology than the younger teachers since they had access to the technology tools for longer period of time than the younger teachers. The above studies reported that older respondents were more likely to demonstrate a higher level of technology competence than their younger counterparts due to the access to technology tools that older respondents have over the younger ones.

On the other hand, Vázquez-Cano, Meneses and García-Garzón (2017) found that younger teachers felt more comfortable working with computers, had higher levels of computer literacy, and had less computer anxiety than older teachers. On the contrary, a significant difference was detected to have existed in the intention to use ICT as learning material and use of ICT to enrich the knowledge. This suggested that the intention younger students have to use ICT as a learning material and as a means to enrich their knowledge far exceed that of the older. The possible explanation suggested by the authors indicated the older students might have already made up their minds concerning ICT whilst the younger students are now looking for information hence would like to search for it using technology. It is also possible that the older students were already skillful in ICT and therefore do not intend to utilize it for their studies.

Attuquayefio and Addo (2016) studied age differences in intention to use ICT in higher educational institutions in Ghana. The authors used a cross-sectional survey to gather information from 950 Ghanaian university students. The outcome of the study indicated that there was no significant difference between younger and older students in the use of ICT.

Statement of the Problem

Over the years, there have been efforts by governments, stakeholders of education as well as NGOs to make sure equal access and opportunities are given to students regardless of their differences in terms of level, gender, age and programme of study. Nonetheless, there seems to be some level of disparities in terms of the technology proficiency of students. In fact, knowledge of students' technology competence is vital in ascertaining whether the set goals of various technology programmes are achieved or otherwise. For example, it is more likely to find few female students in a typical Computer Science programme as compared to their male counterparts.

Since all students are required to graduate with some level of proficiency in technology, it will be out of place to just ignore the dynamics of computer application proficiency and assume that all is well with these students. As instructional designers come up with interventions for our students to learn meaningfully, there is the need for exposure on where our students are in terms of the disparities among them in order to devise strategies to bridge the gap or create the necessary conditions for proper leverage regardless of the extent of the disparity.

Purpose of the Study

The purpose of the current study was to identify whether there were differences among university students in the use of three software applications based on gender, age and programme of study in order to inform teachers of the Information and Communication Technology on the entry behaviour dynamics of their students. Such knowledge will be useful in designing strategic interventions for the students.

Research Questions

1. Are university students interested in learning about computer applications?
2. Are there differences in university students' knowledge in Windows management, Power Point, and email, based on gender?
3. Are there differences in university students' knowledge in Windows management, Power Point, and email, based on age?
4. Are there differences in university students' knowledge in Windows management, Power Point, and email, based on a programme of study?
5. Do university students have the same level of proficiency in Windows management, Power Point, and email?

Research Design

The purpose of this study was to identify the computer literacy of first year university students in one of the public universities in Ghana. Since the study required learners to demonstrate their knowledge in the areas of Windows management, Power Point and Emailing, descriptive survey design was used. Survey research designs are "procedures in quantitative research in which investigators administer a survey to a sample or to the entire population of people to describe the attitudes, opinions, behaviors, or characteristics" (Creswell, 2012, p. 376).

Population and Sampling.
Based on the purpose of the study, the researchers decided to survey all first year students in one of the public universities in Ghana, who were enrolled in different programmes. The choice of the first year university students was strategically made in order to check their entry behaviour in the three areas as Windows Management, Power Point and Emailing. This was to give insight to the ICT department in terms of how to go about the teaching and learning of the ICT course in the Fall Semester, 2018. Since this was a quantitative study, the researcher used the entire population of all first year university students who had enrolled in the Introduction to Information and Communication Technology course offered in the fall semester of 2018. Out of the total population of 1000 students, all 1000 university students participated, representing 100 %.

Instrument
The main method of collecting data was the questionnaire. After reading extensively on the areas to be surveyed, the researchers self-designed a questionnaire for this study. The questionnaire was made up of thirty-four (34) items. The first five items sought data on programme, gender, age, ownership of pens drive, and interest in using computers. The next twenty-nine items were broken down into three sections on *Windows management* (10), *Power point* (9), and *emailing* (10). To check the reliability of the questions, factor analysis was carried out. After the analysis, item one on the Power Point construct was removed, thereby making the number of items nine. The Cronbach Alpha for the three constructs were 0.89, 0.74, and 0.87 for *Windows management*, *Power point*, and *emailing* respectively. The results indicate that the items on the questionnaire were consistent in measuring the three constructs.

Procedure
One of the researchers taught the Introduction to Information and Communication Technology course. As a result, access to the respondents was not a problem. On the first day of lectures to acquaint ourselves and to distribute the course materials, students were informed of the online survey and how to take part in the study. With the collaboration of the various course representatives, the link to the survey was placed at the various WhatsApp platforms of the respective programmes. On the average, students used about five minutes to answer all the questions. Students who did not have smartphones were encouraged to use their friends' phones to answer the survey. In order to check multiple entries, the students were supposed to include their index number.

Findings
Based on the four research questions that the researchers posed, the findings have been organised in such a way to facilitate easy understanding of what the respondents shared with the researchers. Below are the findings.

Research Question 1: Are university students interested in learning about computer applications?

Since the focus of the current study was on the knowledge of students on computer applications, the researcher wanted to find the interest level of university students in learning how to use personal computers. To answer this research question, a simple question was asked whether students were interested in learning how to use computers or not. Based on the findings, ninety-six point three percent (96.3%) of the students indicated that they had interest in the use of computers. The findings implied that university students were intrinsically motivated to learn how to use personal computers.

Table 1. Interest in Learning Computer Use

Variable	Frequency	Percentages
Interest in learning how to use The personal computer	957	96.3
	43	3.7
Total	1000	100

Research Question 2: Are there differences in university students' knowledge in Windows management, Power Point, and emailing, based on gender?

In order to have better perspective of how these applications are being used by the different gender groups so as to come out with interventions to ensure equity, university students' literacy in these three areas were compared. After running the independent samples t-test procedure, the results were as follows: t(974) = 2.005, p = .045 (2-tailed); t(965) = .751, p = .453 (2-tailed); and t(963) = 4.004, p < .001 (2-tailed) for *Windows management*, *Power Point* and *emailing* respectively. The results indicated that there were significant differences between males and females in terms of their literacy level in Windows management and emailing. Males were more likely to have better proficiency in these two areas than their female counterparts. On the other hand, there was no difference between males and females in terms of the knowledge and use of the Power Point software application. Males and females were more likely to demonstrate similar level of literacy.

Table 2. Gender Differences in Variables

Variable	(*t*)	*p-value*
Windows Management	2.005	.045
Power Point	.751	.453
Emailing	4.004	.000

Research Question 3: Are there differences in university students' knowledge in Windows management, Power Point, and emailing, based on age?

The researcher wanted to know whether there was any difference in the age of the university students. As indicated earlier, the university students were categorized into 18-22 years, 23-25 years, and 26 or more years. Based on the findings from the current study, there was no difference in age in either windows management, Power Point, or emailing. The analysis of variance test (ANOVA) indicted *f*(2, 973) = .506, p = .603; *f*(2, 962) = .304, p = .738; and *f*(2, 964) = 070, p < .933 for *Windows management*, *Power Point*, *and emailing* respectively. The findings implied that traditional and non-traditional students were likely to exhibit similar proficiently levels in the three variables. This finding is consistent with Attuquayefio and Addo (2016). These researchers reported that there was no significant difference in technology use in terms of age differences among students.

Table 3. Age Differences of Variables

Variable	*df*	*f-value*	*p-value*
Windows management	(2, 793)	.506	.603
Power Point/	(2, 962)	.304	.738
Emailing	(2, 964)	.070	.933

Research Question 4: Are there differences in university students' knowledge in Windows management, Power Point, and emailing, based on programme of study?

The researchers were interested in all five programme that were offered in one of the public universities in Ghana. The programmes were Early Grade (1), Agricultural Science (2), Integrated Science (3), Environmental and Sanitation Science (4), and Biological Science (5). Once again, the analysis of variance statistical procedure indicated that there were significant differences among the various programmes offered in the university. The findings implied that students who offered different programmes were more likely to show differences in proficiency in computer use. The statistics for the five programmes were $f(4, 976) = 8.466$, $p = .000$; $f(4, 965) = 5.619$, $p = .000$; and $f(4, 967) = 9.146$, $p = .000$.

Table 4. Differences in Programme of Study

Variable	***df***	***f-value***	***p-value***
Windows man. /Power Point	(4, 976)	8.466	.000
Windows man. /emailing	(4, 965)	5.619	.000
Power Point/emailing	(4, 967)	9.146	.000

Also, it was interesting to find that Environmental Health and Sanitation Education had a significant differences with Integrated Science Education and Biological Science Education across all three variables. Based on the Bonferroni post-hoc test to identify where the differences among the various programmes existed, it was identified that a student from the Environmental Health and Sanitation programme was more likely to have lower computer proficiency than students from either Integrated Science Education or Biological Science Education. One of the reasons that might possibly account for the low computer knowledge of the Environmental Health and Sanitation Education students is that about 80% of them were admitted through the matured entrance mode. For this reason, it is more likely that their exposure to the personal computer was limited as compared to the other two programmes that have lower percentage of students admitted through the matured entrance exam. Table 5 shows the differences among the various sub-groups.

Table 5. Bonferroni Post-Hoc Test

Multiple Comparisons

Dependent Variable	(I) Prog2	(J) Prog2	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
COMPUTE Win_Man=wm1 + wm2 + wm3 + wm4 + wm5 + wm6 + wm7 + wm8 + wm9 + wm10	1	2	2.40354	1.26770	.583	-1.1631	5.9701
		3	-1.96765	1.47844	1.000	-6.1272	2.1918
		4	4.57926*	1.38990	.010	.6689	8.4896
		5	.34737	1.36317	1.000	-3.4878	4.1826
	2	1	-2.40354	1.26770	.583	-5.9701	1.1631
		3	-4.37119*	1.11978	.001	-7.5216	-1.2208
		4	2.17572	.99996	.298	-.6376	4.9891
		5	-2.05616	.96246	.329	-4.7640	.6517
	3	1	1.96765	1.47844	1.000	-2.1918	6.1272
		2	4.37119*	1.11978	.001	1.2208	7.5216
		4	6.54691*	1.25645	.000	3.0120	10.0818
		5	2.31503	1.22681	.595	-1.1365	5.7666
	4	1	-4.57926*	1.38990	.010	-8.4896	-.6689

		2	-2.17572	.99996	.298	-4.9891	.6376
		3	-6.54691*	1.25645	.000	-10.0818	-3.0120
		5	-4.23188*	1.11852	.002	-7.3788	-1.0850
	5	1	-.34737	1.36317	1.000	-4.1826	3.4878
		2	2.05616	.96246	.329	-.6517	4.7640
		3	-2.31503	1.22681	.595	-5.7666	1.1365
		4	4.23188*	1.11852	.002	1.0850	7.3788
COMPUTE Email=email1 + email2 + email3 + email4 + email5 + email6 + email7 + email8 + email9 + email10/10	1	2	-.85361	1.18480	1.000	-4.1871	2.4798
		3	-3.28241	1.37783	.174	-7.1589	.5941
		4	1.42153	1.29825	1.000	-2.2311	5.0742
		5	-2.56693	1.27303	.440	-6.1486	1.0147
	2	1	.85361	1.18480	1.000	-2.4798	4.1871
		3	-2.42880	1.04276	.201	-5.3626	.5050
		4	2.27514	.93509	.152	-.3557	4.9060
		5	-1.71332	.89974	.572	-4.2448	.8181
	3	1	3.28241	1.37783	.174	-.5941	7.1589
		2	2.42880	1.04276	.201	-.5050	5.3626
		4	4.70393*	1.17006	.001	1.4120	7.9959
		5	.71547	1.14201	1.000	-2.4976	3.9285
	4	1	-1.42153	1.29825	1.000	-5.0742	2.2311
		2	-2.27514	.93509	.152	-4.9060	.3557
		3	-4.70393*	1.17006	.001	-7.9959	-1.4120
		5	-3.98846*	1.04462	.001	-6.9275	-1.0494
	5	1	2.56693	1.27303	.440	-1.0147	6.1486
		2	1.71332	.89974	.572	-.8181	4.2448
		3	-.71547	1.14201	1.000	-3.9285	2.4976
		4	3.98846*	1.04462	.001	1.0494	6.9275
COMPUTE point=pp1 + pp2 + pp3 + pp4 + pp5 + pp6 + pp7 + pp8 + pp9	1	2	.00473	.91814	1.000	-2.5784	2.5879
		3	-2.34848	1.06960	.284	-5.3578	.6608
		4	1.24819	1.00395	1.000	-1.5764	4.0728
		5	-2.94391*	.98389	.028	-5.7121	-.1758
	2	1	-.00473	.91814	1.000	-2.5879	2.5784
		3	-2.35322*	.81384	.039	-4.6430	-.0635
		4	1.24345	.72540	.868	-.7975	3.2844
		5	-2.94865*	.69738	.000	-4.9107	-.9866
	3	1	2.34848	1.06960	.284	-.6608	5.3578
		2	2.35322*	.81384	.039	.0635	4.6430
		4	3.59667*	.90954	.001	1.0377	6.1557
		5	-.59543	.88735	1.000	-3.0920	1.9011
	4	1	-1.24819	1.00395	1.000	-4.0728	1.5764
		2	-1.24345	.72540	.868	-3.2844	.7975
		3	-3.59667*	.90954	.001	-6.1557	-1.0377
		5	-4.19210*	.80701	.000	-6.4626	-1.9216
	5	1	2.94391*	.98389	.028	.1758	5.7121
		2	2.94865*	.69738	.000	.9866	4.9107
		3	.59543	.88735	1.000	-1.9011	3.0920
		4	4.19210*	.80701	.000	1.9216	6.4626

*. The mean difference is significant at the 0.05 level.

Research Question 5: Do university students have the same level of proficiency in Windows management, Power Point, and emailing?

The above research questions focused on specific sub-groups within the university students in terms of how much they know in the three areas identified. The researcher thought it wise to also look at the overall university students' knowledge in each of the three variables and compare the ratings. For this reason, the paired samples t-test statistical procedure was run. The mean and standard deviation for the three variables were M = 39.5241, SD = 11.05467, M = 30.4142, SD = 8.10623, M = 33.3857, SD = 10.33695 for *Windows management*, *Power Point*, and *emailing* respectively. The findings were as follows: t(959) =30.550, p < .001 (2-tailed); t(955) = 21.144, p < .001 (2-tailed); and t(955) = 9.378, p < .001. From the above information, there was evidence to show that the proficiency of university students in the three areas was not the same. In other words, there was significant differences among the three variables.

Table 6. Paired Samples t-test of the Variables

Variable	***df***	***t***	***p-value***
Windows man. /Power Point	(959)	30.550	.000
Windows man. /emailing	(955)	21.149	.000
Power Point/emailing	(955)	9.378	.000

DISCUSSION

The purpose of the current study was to identify whether there were differences among university students in the use of three software applications based on gender, age and programme of study in order to inform teachers of the Information and Communication Technology entry behaviour dynamics of their students. There were five major research questions that the researcher wanted to find answers to them. After the data collection, analysis and results presentation, the following are the discussions based on the available data.

In response to research question one, almost 97% of the university students indicated that they were interested in learning how to use personal computers. This finding indicates the readiness of our students to be abreast of computer knowledge. Meanwhile, there are might be certain teaching and learning conditions that gradually dump this desire in the students. For example, if students would not need the computer knowledge in writing examinations, it is more likely majority of students will not put adequate time in learning the various applications especially at places where high-stake examinations are used to place students from one level to another.

In terms of the knowledge of males and females on the three software applications, the study found evidence of a significant difference in Windows management and emailing but not Power Point. The differences found in Windows management and emailing seem to support other past studies that reported a significant difference between males and females on technology use (Miliszewska & Sztendur, 2010; Shashaani, 1997; Vázquez-Cano, Meneses & García-Garzón, 2017). On the contrary, there was no difference between males and females in terms of knowledge in Power Point. Similar, there are some studies that have found evidence (Owusu-Ansah, 2013; Verma & Dahiya, 2016). From the evidence on both sides, the findings seem to suggest that a difference between males and females on computer use would be based on the particular software application under study.

Across all the five programmes that respondents were enrolled in, the study demonstrated that there were significant differences in the three variables under study. Students enrolled in BSc.

Agriculture Education, BSc. Biological Science Education, BSc. Integrated Science Education, BSc. Environmental Health Education and B.ed Early Grade Education programmes were not likely to exhibit the same level of computer knowledge in the three areas. At this moment, it is not clear to the researcher what might have led to the differences since students across the various prgrammes have similar teaching and learning conditions in the university. Therefore, a need exists for future studies to look into the reasons why there are differences in the use of different computer applications.

There are vrious studies that have reported their findings on the differences that exist in the age of university students in the use of computers. However, there was no evidence from the current study. Among all three areas (Windows management, Power Point and emailing) tested, there was no significant difference. This finding might be due to how the different age groups were categorised. When the age differences are very close, it is more likely for university students to demonstrate similar knowledge traits.

REFERENCES

Acquah, Y. B. S. (2012). Status of implementation of the ICT Curriculum in Ghanaian Basic Schools. *Journal of Arts and Humanities*, *1*(3), 27–37.

Adebi-Caesar, T. E. (2012). *Assessment Of I . C . T Situation in Senior High Schools , A Case Study in Lower Manya Krobo District*. Kwame Nkrumah University of Science and Technology. Retrieved from www.knust.edu.gh

Adogla-Bessa, D. (2016). MTN commissions library , ICT centre at New Juaben SHS. Retrieved from www.citinews.com

Appianing, J., & Eck, R. N. Van. (2015). Gender Differences in College Students ' Perceptions of Technology-Related Jobs in Computer Science. *International Journal of Gender, Science and Technology*, *7*(1), 28–56.

Attuquayefio, S. N., & Addo, H. (2016). Gender and Age Comparison of Information Communication and Technology Usage among Ghanaian Higher Education Students. *American Journal of Information Systems*, *4*(1), 1–6. https://doi.org/10.12691/ajis-4-1-1

Bicen, H., & Kocakoyun, S. (2013). The Evaluation of The Most Used Mobile Devices Applications by Students. *Procedia - Social and Behavioral Sciences*, *89*(October), 756–760. https://doi.org/10.1016/j.sbspro.2013.08.928

Bervell, B., Ahiatrogah, P. Laryea, J. E., & Essilfie, G. (2013). Integrating Information Technology into Pedagogy. *Gender Perspective*, *2*(6), 245–254.

Boni, R. K. (2018). *The Use of ICT for Teaching and Learning in Senior High Schools in Ghana: A Study of Nungua and Presbyterian, Teshie*. University of Ghana. Retrieved from http://ugspace.ug.edu.gh

Bouhnik, D., & Deshen, M. (2014). WhatsApp Goes to School : Mobile Instant Messaging between Teachers and Students. *Journal of Information Technology Education: Research*, *13*, 217–231.

China hands over refurbished ICT lab to Ejisuman SHS. (2016). Retrieved April 27, 2019, from www.myjoyonline.com

Ellis, A., & Newton, D. (2009). First year university students ' access , usage and expectations of technology : An Australian pilot study. In Bastiaens (Ed.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2009* (pp. 4–9). Vancouver, BC, Canada: AACE.

Fomsi, F. E., & Emeka, O. S. (2017). Gender Differences in the use of ICT among Teachers in Model Primary Schools in Rivers State, Nigeria. *British Journal of Education*, *5*(4), 88–94.

Gertrude, N. A. (2016). KPMG provides Dzorwulu Junior High School with a computer lab. Retrieved April 27, 2019, from www. graphc.gh

Hennessy, S., Harrison, D., & Wamakote, L. (2010). Teacher Factors Influencing Classroom Use of ICT in Sub-Saharan Africa. *Itupale Online Journal of African Studies*, *2*(2010), 39–54.

Hu, C., & Wong, P. (2009). Patterns of email use by teachers and implications : A Singapore experience Keywords. *Computers and Education*, *53*(3).

Kolan, B. J., & Dzandza, P. E. (2018). Effect of Social Media on Academic Performance of Students in Ghanaian Universities : A Case Study of University of Ghana , Legon . *Library Philosophy and Practice (e-Journal)*, (February), 1–24.

Mensah, F. S. (2017). Ghanaian Tertiary Students ' use of ICT. *Global Journal of Human Social Science: G Linguistics and Education*, *17*(9), 13–18.

Mereku, D. ., Yidana, I., Hordzi, W., Tete-Mensah, I., Tete-Mensah, W., & Williams, J. . (n.d.). *GHANA REPORT* (pp. 11–28). Winneba.

Miliszewska, I., & Sztendur, E. M. (2010). Interest in ICT Studies and Careers : Perspectives of Secondary School Female Students from Low Socioeconomic Backgrounds. *Interdisciplinary Journal of Information, Knowledge, and Management*, *5*, 237–260.

Ministry of Education Ghana. (2015). *Ict In Education Policy* (pp. 1–49). Ghana.

Moghaddam, G. G. (2010). Information technology and gender gap : toward a global view. *Emerald: The Electronic Library*, *28*(5), 722–733. https://doi.org/10.1108/02640471011081997

Mustafa, M. N. (2014). The Effects of Gender Differences in Ict Application : Bridging the Gap of Knowledge and Skills among Teachers. *Australian Journal of Basic and Applied Science*, *8*(10), 81–86.

Owusu-ansah, S. (2013). Application Of Information And Communication Technology (Ict): A Comparative Analysis Of Male And Female Academics In Africa. *Library Philosophy and Practice (e-Journal)*, 1–35.

Peprah, O. M. (2016). ICT Education in Ghana : An evaluation of challenges associated with the teaching and learning of iCT in Basic Schools in Atwima Nwabiagya District in Ashanti Region. *European Journal of Alternative Education Studies*, *1*(2), 7–27.

Shashaani, L. (1997). Gender Differences in Computer Attitudes and Use among College Students. *Journal of Educational Computing Research*, *16*(1), 37-51.

Shashaani, L. (1994). Gender-Differences in Computer Experience and its Influence on Computer Attitudes. *Journal of Educational Computing Research, 11*(4), 347-367.

Uma, M. P., & Arulchelvan, S. (2012). Usage of ICT among the Students and Teachers and its Impact on their Communication Behaviour. *European Journal of Social Sciences*, *36*(2), 160–170.

Vázquez-Cano, E., Meneses, E. L., & García-Garzón, E. (2017). Differences in basic digital competences between male and female university students of Social Sciences in Spain. *International Journal of Educational Technology in Higher Education*, *14*(1). Retrieved from https://doi.org/10.1186/s41239-017-0065-y

Verma, C., & Dahiya, S. (2016). Gender difference towards information and communication technology awareness in Indian universities. *SpringerPlus*, *5*(370), 1–7.+

Wang, G. (2010). The Application of E-mail to College English Teaching in China. *English Language Teaching*, *3*(2), 129–134.

Yau, H. K., & Cheng, A. L. F. (2012). Students' Age Difference of Confidence in Using Technology for learning in Higher Education. *The Turkish Online Journal of Educational Technology*, *11*(3), 308–311.