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Gender and Age Comparison of Information Communication and Technology Usage among Ghanaian Higher Education Students

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Abstract The paper attempts to explore gender and age differences in intention to use ICT and ICT usage, by students of higher educational institutions in Ghana. Cross-sectional survey designed was employed for the data collection. The study was carried on 950 Ghanaian higher educational students. We use the t-test statistics to investigate the difference among groups. There was no difference in intention to use ICT between male and female student. However, there were significance differences in the use of ICT among gender, male students actually use the ICT for learning and research more than their female counterpart. There were mixed results in the use of ICT between the young and the old students, however, there was no significant difference in the use of ICT for learning and research. Promoters of ICT usage in higher education must institute measures that could bridge the gap between male and female ICT use behaviour. Self confidence building programs must be organized for the female student so that can comfortably communicate with their peers and lecturers.

Keywords: *intention to use ICT, ICT usagez*

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1. Introduction

All over the world, administrators of higher educational institutions have incorporated ICT into teaching and learning so as to enhance and facilitate academic work. Although there are varying ICT application in various institutions across different country, studies in these phenomena show varying results in the extent of ICT usage among different age and gender groups. This paper sought to investigate the extent to which Ghanaian students' intention to use ICT and usage behaviour is different between gender (male and female) and age (old and young).

Khalid Mahmood [6] explored the gender, subject (academic discipline) and degree (graduate vs. undergraduate) differences in access, use and attitudes toward information and communication technology (ICT) of the students of the University of the Punjab. The findings from the study suggest that Male and female students are different in using various ICT based services such as Internet, email and chat. Male students use these services more than female students. With regards to use of search engine and searching databases for academic purposes, the findings of Gurol suggested that male student were more effective than the female students. This findings reinforces the stereotype claim that girls have negative attitudes towards computers and are reluctant to use them Milan Kubiatko and Halakova [8].

However, on the contrary, the results of Neil [10] in the investigation of differences in undergraduates academic use of the internet, found that female students are more likely to use the internet to seek for academic information than the male students. Inoue suggested that students' portray positive attitude in the use of ICT and found no gap in students' perception of ICT usage attitude. Owusu-Ansah [9] investigated or verified whether gender affects the use of Information and Communication Technology (ICT) facilities among academics the findings of the study suggested that there is no gap in the usage of ICT for both male and female.

Although Bennett, Maton, and Kervin [2] suggested that young people have been immersed in technology all their lives, a condition, that filled them with sophisticated technical skills and learning preferences for which traditional education was unprepared. The findings from this research suggest that there is no significant difference in the use of ICT between young and old student. Also, Neil [10], in his quest to investigate the differences in undergraduate' academic use of the internet found no gap between young and old students.

In view of the varying findings from the use of ICT among gender and age groups of students from higher educational institution, hence, the following questions were formulated to address the objective of the study.

- Is there any significance difference in male and female students' intention to use ICT for learning and research?
- Is there any significance difference in male and female students' ICT use for learning and research?
- Is there any significance difference in young and old students' intention to use ICT for learning and research?
- Is there any significance difference in young and old students' ICT use for learning and research?

2. Methodology

To achieve the objective of the study, the research questions were address through quantitative methods where cross-sectional survey designed was used to elicit data from a large number of students through questionnaire. Purposive sampling scheme was employed for this study. The questionnaires were administered at three private universities and three public universities in Ghana. The public universities include University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST) and University of Cape Coast (UCC). The private universities include Methodist University College, Ghana (MUCG), Accra Institute of technology (AIT) and Central University College (CUC). The questionnaires were administered by the researcher and a representative from each institution. The representatives were trained by the researcher on how to administer the questionnaire.

A total of 1500 questionnaires were administered and 972 were received. However, only 955 were useful responses. Seventeen (17) of the responses were not engaging (i.e. respondents ticked the same number for all items). They were not included in the sample size. Table 1 presents details of the survey (quantity of questionnaires administered, received and response rate) from each of the 6 institutions chosen for the survey. The response rates from the institutions portrayed in Table 1 were very satisfactory since a 30% response rate is considered acceptable.

Table 1. Summary of Data Collection

Institution	Questionnaire Administered	Questionnaire Received	Response Rate (%)
UG	500	305	61.0
KNUST	300	170	56.6
UCC	200	104	52.0
CUC	150	82	54.7
MUCG	200	152	76.0
AIT	150	142	94.7
TOTAL	1500	955	63.7

Analyzing survey data is an important and exciting step in the survey process. It is the time that important facts about respondents may be revealed, uncover trends that might not otherwise have known existence, or provide irrefutable facts to support your plans.

Although, this seems like an obvious thing to do, many surveyors think that they can skip this step and dive right in to data analysis. In this study, a quick review of the response of the survey was checked to find out flaws, before committing hours of time in analyzing the data.

During the quick review, every question was examined to see if the results were intelligible. This instinctive check of the data uncovered issues with the survey. A quick review of the data also help understood whether the respondents were appropriate subjects or capture a representative sample of all students. In addition the quick review enabled the researcher to identify and highlight problems associated with the survey instrument and also showed areas were detailed data analysis can be focused.

It is important that before a researcher examines quantitative data to test hypotheses the data is put in a form that is suitable for capturing into a data analysis software. Data coding is systematically reorganizing raw data in a format that is machine readable (i.e. easy to analyse using computer [12]). Responses received from representatives were checked for errors and inconsistencies. The responses were also numbered serially as and when checking was completed. Codes were assigned to each item by combining the sub-title code and the item number. These codes were used as variable names in Statistical Package for Social Sciences (SPSS). Data extracted from responses were entered into SPSS according to the serial numbers assigned to the questionnaire by the researcher to facilitate easy retrieval of questionnaire when errors were detected during editing.

Data captured into SPSS were screened and anywhere errors occurred, the corresponding questionnaire was retrieved to ascertain the veracity of the error before the necessary corrections were executed. This exercise was undertaken to ensure that data entry errors were eliminated. Descriptive statistics such as minimum and maximum from SPSS were used to determine responses on variables which were out of range. The variance on each case was also examined to determine cases which were not engaging (i.e. respondents providing the same response to all variables per a case).

Descriptive and inferential data analysis techniques were utilized. SPSS version 16 was used for all the analysis. The selection of these software packages was based on the flexibilities and vast functionalities it provides in handling the aforementioned analysis. In addition, many scholars have employed these software in their studies successfully [1,3,11]. Hence the researcher considered it more appropriate for this study.

The researcher employed descriptive data analysis to investigate the general awareness and usage of ICT in higher educational institutions. It was also carried out across the available data to unveil any hidden pattern. The results of the descriptive analysis are presented in section 3.0.

The independent-samples t-test, was applied, to compare the mean scores of two different groups of students in relation to intention to use ICT for learning and research and usage behaviour. It provides information on whether there is a statistically significant difference in the mean scores for two groups. In statistical terms, the test investigates the probability that the two sets of scores came from the same population. The characteristics on which the comparisons were carried on include gender (male and female), age (young and old) and the continuous variables in this instance are intention to use ICT and ICT usage behaviour.

Techniques in this section assume that samples are obtained from populations of equal variances [13]. This

means that the variability of scores for each of the groups is similar. To test this, SPSS performs the Levene test for equality of variances as part of the t-test and analysis of variances analyses. According to [13], if a significance value of less than .05 is obtained, it suggests that variances for the two groups are not equal, and there is violation of the homogeneity of variance assumption. However, for t-tests, SPSS provides two sets of results, for situations where the assumption is not violated and when it is violated.

Assessing differences between groups from a report generated by SPSS, two values under the column labelled Sig. (2-tailed) are provided for equal variance and unequal variance.

According to [13],

- Choose whichever value is applicable to the Levene's test result.
- If the value in the Sig. (2-tailed) column is equal or less than .05, then there is a significant difference in the mean scores on the dependent variable for each of the two groups.
- If the value is above .05, we conclude that there is no significant difference between the two groups.

3. Presentation of Results

Table 2 shows the results of the age distribution of the students sampled. Majority of Large number of students were below 25 years. They constitute 53.8 % of the students sampled. 31.5% and 10.7 % of the students sampled were between the ages 25 to 34 and 35 to 45 respectively. Only 4% of the students sampled were 46 years and above. In order to use the sample t-test, ages of the respondents were reclassified as young and old. Students whose ages were below 35 years were classified as young and those who were 35 years and above were classified as old students. 85.3% of the respondents were classified as young and 14.7% were classified as old (See Table 3).

Table 2. Age Distribution of Students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 24 years	514	53.8	53.8	53.8
	25-34 years	301	31.5	31.5	85.3
	35-45 years	102	10.7	10.7	96.0
	46 years	38	4.0	4.0	100.0
	Total	955	100.0	100.0	

Table 3. Reclassification of Ages of students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Young(Below 35 years)	815	85.3	85.3	85.3
	Old(35 years and above)	140	14.7	14.7	100.0
	Total	955	100.0	100.0	

The distribution of gender presented on Table 4 demonstrates that males comprised 52.7% per cent of the sample size while females comprised of 47.3% per cent.

Table 4. Gender Distribution of Students

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	503	52.7	52.7	52.7
	Female	452	47.3	47.3	100.0
	Total	955	100.0	100.0	

A cross tabulation of age and gender portray that respondents below 24 years were made up of male (51.4%) and female (48.6). Between ages 25 to 34 years the percentages of males and females were 56.8% and 43.2% respectively. In the next age classification, 35 to 45 years, there were 102 respondents and 47.1% were males and 52.9% were females. Students who were 46 years and over at the time of data collection were 38 in number, comprised of 20 males (52.6%) and 18 females (47.4%). Clearly apart from the ages between 35 and 45 where females' percentage was high, in the other groups, females' percentages were very low compared to the males. (see Table 5 for details)

Table 5. AGE * GENDER Cross tabulation

			GENDER		Total
			Male	Female	
AGE	Below 24 years	Count	264	250	514
		% within AGE	51.4%	48.6%	100.0%
		% within GENDER	52.5%	55.3%	53.8%
		% of Total	27.6%	26.2%	53.8%
	25-34 years	Count	171	130	301
		% within AGE	56.8%	43.2%	100.0%
		% within GENDER	34.0%	28.8%	31.5%
		% of Total	17.9%	13.6%	31.5%
	35-45 years	Count	48	54	102
		% within AGE	47.1%	52.9%	100.0%
		% within GENDER	9.5%	11.9%	10.7%
		% of Total	5.0%	5.7%	10.7%
	46 years	Count	20	18	38
		% within AGE	52.6%	47.4%	100.0%
		% within GENDER	4.0%	4.0%	4.0%
		% of Total	2.1%	1.9%	4.0%
Total		Count	503	452	955
		% within AGE	52.7%	47.3%	100.0%
		% within GENDER	100.0%	100.0%	100.0%
		% of Total	52.7%	47.3%	100.0%

It is also evident in the in Table 6 that the percentage of older female students was greater than males students, however, for younger students the percentage respondents was higher for males than females.

Table 6. Age grouped as young and old * Gender Cross tabulation

			GENDER		Total
			Male	Female	
Age	Young	Count	435	380	815
		% within Age	53.4%	46.6%	100.0%
		% within GENDER	86.5%	84.1%	85.3%
		% of Total	45.5%	39.8%	85.3%
	Old	Count	68	72	140
		% within Age	48.6%	51.4%	100.0%
		% within GENDER	13.5%	15.9%	14.7%
		% of Total	7.1%	7.5%	14.7%
Total		Count	503	452	955
		% within young	52.7%	47.3%	100.0%
		% within GENDER	100.0%	100.0%	100.0%
		% of Total	52.7%	47.3%	100.0%

Having examined the responses from the students, the researcher compared the responses of groups in relation to students' intention to use ICT for learning and research and usage behaviour. Characteristics that were grouped include gender (male and female) and Age (young and old).

Comparing male (503) and female (452) responses toward intention to use ICT and ICT usage, equal variance was assumed for all items for both continuous variables except for situations where students use ICT to search for research data. The Levene's Test for Equality of Variances significant value was .05, hence equal variance not assumed figures where used as suggested by Pallant [13].

Table 7 presents details of independent-sample T-test from SPSS for gender on the two continuous variables. There was no significant difference in the scores for male (M=4.89, SD =1.93) and female (M=4.65, SD=1.98); t(953) =0.146, p=.884 on intention to use ICT more when learning in class. The results also showed that there was no significant difference in the scores for male (M=4.10, SD =2.10) and female (M=3.74, SD=2.05); t(953)=1.147, p=.252 on intention to use ICT for forum discussion. Furthermore, the results showed that there was no significant difference in the scores for male (M=5.21, SD=1.90) and female (M=4.94, SD=2.03); t=(953)=1.174, p=.241 on intention to use ICT for more learning materials. The results again showed that there was no significant difference in the scores for male (M=5.32, SD=1.78) and female (M=5.12, SD=1.87); t(953)=.962, p=.336 on intention to use ICT to enhance knowledge. In comparing male and female intentions to use ICT to contact lecturers, the results showed that there was no significant difference in the scores of male (M=4.60, SD=2.10) and female (M=4.13, SD=2.14) t(953)=1.691. p=.091.

On the other hand, there were some significant differences in the mean scores of male and female response in ICT usage. The results clearly shows that there was significant difference in the scores for male (M=5.44, SD=1.63) and female (M=5.32 SD=1.63); t(953)=2.162, p=.009 on students usage of ICT to communicate with their lecturers. There was also significant difference in the mean scores for male (M=5.95, SD=1.33) and female (M=5.84, SD=1.51); t(953)=2.146, p=.032 on the use of ICT to search for information for research. The results further show that there was also significant difference in the mean scores for male (M=5.39, SD=1.80) and female (M=5.19, SD=1.87); t(953)=3.426, p=.001 on the use of ICT to contact peers and forum discussions. However, there were also no significant difference in the mean scores for male (M=6.16, SD=1.31) and females (M=6.08, SD=1.47); t(953)=1.70, p=.001 and male(M=5.21, SD=1.85) and female (M=5.19, SD=1.88); t(953)=1.88, p=.06 on the use of ICT to enhance their knowledge and for their studies respectively.

The mean scores for males on the items which were significant exceeded that of female respondents. Thus the findings suggest that male respondents use the ICTs provided by their institution, to communicate with their lecturers, search for information for research, contact peers and have forum discussions more than the female subjects.

Table 7. Independent Samples Test for two Age Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means				
Items	F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
E11: I intend to use ICT more when learning in class	0.08	0.781	0.146	953	0.884	0.018	0.121
E12: In tend to use the ICT more for forum discussion	0.21	0.647	1.147	953	0.252	0.121	0.106
E13: In tend to use the ICT more for learning materials	3.84	0.05	1.174	904.236	0.241	0.109	0.093
E14: I intend to use the ICT more for enhancing my knowledge	0.58	0.445	0.962	953	0.336	0.086	0.09
E15: I intend to use the ICT more for lecturer contact and receiving advice	0.47	0.492	1.691	953	0.091	0.201	0.119
F11: I use the ICTs provided by my institution for my studies	1.59	0.208	1.88	953	0.06	0.239	0.127
F12: I use the ICT provided by my institution to communicate with my lecturers	0.02	0.901	2.612	953	0.009	0.351	0.134
F13: I use the ICT provided by my institution to search for information for my research	3.09	0.079	2.146	953	0.032	0.273	0.127
F14: I use the ICT provided by my institution to enhance my knowledge	0.37	0.546	1.699	953	0.09	0.201	0.118
F15: I use the ICT provided by my institution to contact peers and forum discussions	0.59	0.444	3.426	953	0.001	0.47	0.137

Subjects were divided into two age groups, namely old (35 years and over) (815) and young, (below 35 years). There were 140 and 815 old and young respondents respectively. Groups' responses toward the continuous variables, intention to use ICT and ICT usage were compared using independent samples T-test from SPSS. The results were presented Appendix C, Table 5.21. The results show that there were no significant difference in the use of ICTs by the two age groups for learning and research. However, there was significant difference in the mean scores for young (M= 5.14, SD =1.93) and old (M=4.76, SD=2.12); t(953)=2.08, p=.038 on intention to use the ICT for learning materials. Another significant difference occurred in the mean scores for young (M=5.28, SD=1.80) and old (M=4.94, SD=1.95); t(953)=2.04, p=.041 on groups intention to use ICT for enhancing their knowledge.

The finding suggested that younger students' intention to use ICT provided by their institutions for learning materials and enhance knowledge, exceeds that of the older students

Table 8. Independent Samples Test for two Age Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
I intend to use ICT more when learning in class	3.77	0.05	1.652	953	0.099	0.296	0.179	-0.06	0.648
In tend to use the ICT more for forum discussion	2.94	0.09	-1.12	953	0.262	-0.214	0.19	-0.59	0.16
In tend to use the ICT more for learning materials	4.33	0.07	2.08	953	0.038	0.374	0.18	0.021	0.726
I intend to use the ICT more for enhancing my knowledge	0.91	0.34	2.043	953	0.041	0.34	0.166	0.013	0.667
I intend to use the ICT more for lecturer contact and receiving advice	0.04	0.85	-0.06	953	0.949	-0.012	0.195	-0.4	0.37
I use the ICTs provided by my institution for my studies	0.3	0.59	1.588	953	0.113	0.27	0.17	-0.06	0.603
I use the ICT provided by my institution to communicate with my lecturers	0	0.97	0.193	953	0.847	0.029	0.149	-0.26	0.322
I use the ICT provided by my institution to search for information for my research	3.88	0.05	1.779	953	0.075	0.231	0.13	-0.02	0.486
I use the ICT provided by my institution to enhance my knowledge	0.35	0.56	1.303	953	0.193	0.165	0.127	-0.08	0.414
I use the ICT provided by my institution to contact peers and forum discussions	0.79	0.37	-1.04	953	0.3	-0.174	0.168	-0.5	0.156

4. Discussion

The results clearly suggest that gender gap exist in ICT usage among students of higher educational institution. Male students, on the average use the ICTs provided more often to communicate with their lecturers, search information for research, and contact peers for forum discussions more than the female students. The findings also suggest that male students are more confident to interact with others through the ICT provided than the females. On the other hand one could also say that the female student feel shy to interact or fear of being able to do it. Since there are no significant differences in their intention to do it. It also reinforces the stereotype claim that girls have negative attitudes towards computers and are reluctant to use them Milan and Halakova [8]. This result corroborates Gurol whose findings suggested that male student with regard to use of search engines and searching databases for academic purposes were more effective than the female students. A study by Khalid [6] in Pakistan supports the results. The results also agree with Venkatesh and Moris [14] who suggested that male students are more assertive, impatient and goal oriented. Female students may like to use the traditional library system for research information.

However, other past studies assert that there is significant difference in the use of ICT by male and female students. For example the results of Neil [10] in the investigation of differences in undergraduates academic use of the internet, found that female students are more likely to use the internet to seek for academic information than the male students. Owusu-Ansah [9] suggested that there is no gap in the usage of ICT for both male and female. On the contrary, a study by Inoue [5] suggested that students' portray positive attitude in the use of ICT and found no gap in students' perception of ICT usage attitude.

Although Bennett, Maton, and Kervin [2] suggested that young people have been immersed in technology all their lives, a condition, that filled them with sophisticated technical skills and learning preferences for which traditional education was unprepared. The findings from this research suggest that there is no significant difference in the use of ICT between young and old student. This finding agree with the results of Neil [10], in his quest to investigate the differences in undergraduate' academic use of the internet which actually contradicts the results by [7]. However, some significant differences were established in the intention to use ICT for learning materials and use of ICT to enhance their knowledge. The findings from the research suggest that younger students' intention to use ICT provided for learning materials and enhance knowledge

exceeds that of the older students. This may be attributed to the fact that the older students have already made their intention but the younger students are now getting more information hence they want to dig deep for information. It could be that older students are skillful and active in the use of the ICTs hence majority did not intend to use it for their learning materials and knowledge.

The results confirm earlier study Glenda Gay, Sonia Mahon, Dwayne Devonish, Philmore Alleyne and Peter G. Alleyne [4] were there was no significance difference among the different age groups in the use of ICT

5. Conclusion

To help address this objective, the questionnaire was structured to cater for the different demographic groups in section A of the measuring instrument. Having examined the responses from the students, the researcher compared the responses of groups in relation to students' intention to use ICT for their studies and research and usage behaviour. Characteristics grouped include gender (male and female) and Age (young and old).

The analysis was conducted by using the independent-samples t-test in SPSS 16. Levene's test for equality of variance was applied to tests whether the variance (variation) of scores for the two groups compared is the same. The outcome of this test determines which of the t-values SPSS provide is correct for use. The choice is dependent on the Sig level of levene's test. If the Sig. value is above .05 then equal variances assumed, however if the significance level of Levene's test is at most .05 then variance of the two groups are not the same. Thus the data violate the assumption of equal variance. Depending upon the levene's test the appropriate Sig (2-tailed) was chosen. There exist significant difference in the mean scores on the dependent variable for the two groups when Sig. (2-tailed) is at most .05. However, if the value is greater than .05 then there exists no significant difference.

The findings from the analysis suggested that both gender and age groups showed significant difference in students' intention to use ICT for learning and research and use behaviour. The mean scores for males on the items which were significant exceeded that of female respondents. Thus, the findings suggested that male respondents use the ICTs provided by their institutions to communicate with their lecturers, search for information for research, contact peers and have forum discussions more than the female subjects. This can be attributed to female students' confidence level. They tend to have worries or nervousness or uncertainty about the responses when collaborating with their peers and lecturers. They also underestimate their skills in ICT usage. Another reason could be the attitude portray by peers and lecturers. Positive attitudes may encourage female students to use the ICTs for collaboration. The research finding also suggested that younger students' intention to use ICT provided by their institutions for learning materials and enhance knowledge, exceeds that of the older students. The younger generation had ICT training at the senior high school, and most of them have enough time to explore, thus formulating intention to use ICTs for learning and research more than the older generation.

Promoters of ICT usage in higher education must institute measures that could bridge the gap between male and female ICT use behaviour. Self confidence building programs must be organized for the female students so that they can comfortably communicate with their peers and lecturers.

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