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Postgraduate Students' Perception Towards the Use of ICT in Research in Ghanaian Public Universities

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POSTGRADUATE STUDENTS' PERCEPTION TOWARDS THE USE OF ICT IN RESEARCH IN GHANAIAN PUBLIC UNIVERSITIES

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Abstract

The use of ICT in research has become significant among postgraduate students. However, available literature shows that there is little research on the perception and adoption of this technology in developing countries. This problem has created gap in the existing literature. This, therefore, make it necessary to find out more about the perceptions of postgraduate students on the use of ICT in research. The paper intents to discuss these. The paper adopted the survey methodology by using the stratified and convenience sampling techniques to select 346 postgraduate students from University of Ghana and University of Cape Coast to participate in the study. Incorporating the Technology Acceptance Model 3 (TAM3), this study revealed the following: Most postgraduate students perceive the use of ICT applications in research as very important. Again, majority of them intimated that ICT facilities that their institutions provided met their research needs. The findings further indicated that students accessed ICT applications for quick access to information, convenience of access to information, time saving, and currency of information accessed. This paper strongly recommends that public universities in Ghana should maintain the already existing ICT facilities. However, they should ensure that all ICT facilities are monitored and maintained.

Keywords: ICTs, Research, Perception, Postgraduate Students, Public Universities, Ghana

INTRODUCTION

Adopting advanced ICT in academic institution can be influenced by the perceptions and attitudes of students, researchers and faculty towards it. The application of ICT in research has caused significant transformation in our modern world not only because it helps to save time and money used during and after research, but it also reduces the difficulty in working with big data or information resources which were impossible in the past. This has advanced the analysis of research findings (University of Cape Town, 2016).

Besides these, use of ICT in research has dramatically reduced the barriers and obstacles in research attributable to distance through the use of social networks and web portals such as 'MyNetResearch' (Anandarajan & Anandarajan, 2010). ICT enables researchers to gather data from thousands of subjects at a low cost which gives researcher the ability to explore the effects of the minor procedural changes or to tease out interactions that might be missed in a smaller sample (American Psychological Association, 2016). ICT has also developed research process by making it more effective, efficient and collaborative (Western Sydney University, 2015). ICT provides members and institutions with support strategies through collaboration, resource sharing, webinars and custom consultations (Clement & Duinen, 2015).

The application of ICT in research has equipped researchers in the University of Cape Town (UCT) with world-class expertise and facilities in the: collection and management of research data; modelling, simulation and data processing through high-performance computing; comprehension of big data through visualisation and data science techniques; dissemination of research outcomes (including data and workflows); promotion of collaborative research through virtual labs and cloud resources; and the development of customised research software, hardware and services (University of Cape Town, 2014). This innovation is to provide students, faculty and the university community applications and services that can assist them in their research endeavours.

Consequently, the rates at which ICTs are utilized by African universities have positive impact on the level of patronage to electronic materials and applications by academics, students and researchers (Moahi, 2009). It can be said that the adoption of ICT in research contribute immensely to the realization of institutional goals through the provision of adequate, timely and effective information to students, faculty and the university community.

Problem Statement

Despite the value of ICT in research in the provision of effective and efficient research, available literature shows that research into the awareness, perception and usage of and support for ICT in research is not up to the level expected. This problem is more peculiar to developing countries. For example, Borgman (2006) stated that, there is relatively little research on the use of ICT in research especially in determining how and whether these technologies will facilitate easy communication or enable access to new forms of knowledge. Similarly, Meyer and Dutton (2009) pointed out that there is relatively little knowledge and awareness on the use of ICT in research and its impact on actual research practices and outcome. Again, Adeagbo et al., (2016) found out a similar low awareness and usage of ICT in research by researchers. This has necessitated a research to investigate the perception towards ICT used in research by postgraduate students in University of Ghana (UG) and University of Cape Coast (UCC) and to give necessary recommendations for improvement of current situations.

Background of the two public universities

The University of Ghana, the premier university and the largest university in Ghana was founded as the University College of the Gold Coast by Ordinance on August 11, 1948 for providing and promoting university education, learning and research. As a University poised to distinguish itself in research to make an impact at the national and international level, the University has launched a new Strategic Plan. This new strategic plan (2014-2024) is intended to consolidate the gains made from the review of the University's mission and practices and situate these within the context of a very

dynamic environment of higher education in Ghana and beyond. University of Ghana is run on a collegiate system and comprises the following colleges: College of Basic and Applied Sciences, College of Education, College of Health Sciences, College of Humanities. In addition, the University has several research institutions and centres for learning and research (University of Ghana, 2015).

The UG Graduate School co-ordinates graduate level academic programmes for the Colleges, Schools, Institutes/ Centres and Department within the University. The School has a population of about 4000 graduate students offering programmes including Master of Arts (MA), Master of Science (MSC), Master of Public Health (MPH), Master of Laws (LLM), Master of Business Administration (MBA), and Executive Master of Business Administration (EMBA), Master of Philosophy (MPhil), Master of Fine Arts (MFA), Doctor of Medicine (MD), and Doctor of Philosophy (PhD/DPhil). UG graduate students receive learning and research support in form of bursary, grants, services, scholarships, prizes and modern ICT facilities/infrastructures. For example, graduate students are provided with facilities, services and resources such as research commons, databases, wireless internet connection, conference room, and seminars and presentation rooms. Others include Myilibrary Ebooks, ELSEVIER Ebooks, LiveChat, Article Request Form, Software Installation and Discussion rooms. These are supposed to enhance the research output of graduate students in the university and thereby providing real life solutions to national and international problems (University of Ghana, 2014).

The University of Cape Coast (UCC) was established in 1962 initially to produce graduate professional teachers for second cycle schools. Currently, UCC offers many academic programmes which are grouped under five (5) colleges headed by Provosts, namely: College of Agricultural and Natural Sciences, College of Education Studies, College of Health and Allied Sciences, College of Humanities and Legal Studies and College of Distance Education. The University of Cape Coast aimed at achieving its vision of becoming a Centre of Excellence in Africa and the world for human resource and entrepreneurship development in education and other related sectors (University of Cape Coast, 2017).

The UCC Graduate School is responsible for the co-ordination of graduate level academic programmes in the University. There are about 5000 graduate students on regular, distance and sandwich modes offering programmes in MA, M.Ed., MPhil, D.Ed. and PhD. UCC provides students with facilities, resources and services such as study areas, ICT and research training, software installation and internet connectivity to facilitate their research. For example, the UCC Graduate School in collaboration with the library provide e-resources and Mendeley seminar and other ICT related training to graduate students to equip them with the necessary skills needed to complete their studies and researches. These essential skills help graduate students to research and write their theses, dissertations and term papers that are required of them to undertake as a part of their education (University of Cape Coast, 2017b).

Literature Review

eResearch is defined by the University of Cape Town (2014), "as the use of advanced computing and information technology (IT) to drive research and scientific discovery" (p.4). In addition, eResearch is ICT-enabled research which connects researchers with world-class expertise and facilities in the following areas: collection and management of research data; modelling, simulation and data processing through high-performance computing; comprehension of big data through visualisation and data science techniques; dissemination of research outcomes (including data and workflows); promotion of collaborative research through virtual labs and cloud resources; and the development of customised research software, hardware and services (University of Cape Town, 2014).

Perception, in this context, is the way in which something is regarded, understood, or interpreted (Oxford University Press, 2017). In other words, it is the impression or attitude grounded on what is thought or observed. Users adopt ICTs use in research mainly because of its perceived benefits and importance to their research output. Therefore, users' attitude toward the use of ICT in research is very vital to its adoption. The perceived benefits may not only be personal to the user but also to research

cohorts or research institutions. The benefits range from increasing the ranking of the institutions, to enhancing the research communication and collaboration among researchers across and within institutions, preparing data management plan for a research project and providing researchers support in the storing and sharing data, metadata records and data files (Adeagbo et al., 2016; Arcila-Calderón, Piñuel-Raigada, & Calderín-Cruz, 2013; Bradbury & Borchert, 2010; Dutton & Meyer, 2009; Hellmers, 2009; Meyer & Dutton, 2009). For example, Arcila-Calderón et al. (2013) noted that respondents demonstrated a very positive attitude towards eResearch, with 69.14% classifying the use of digital technologies in research as 'extremely beneficial'. In this manner, 47.78% of respondents agreed with the statement 'eResearch increases my individual productivity' and 53.48% also agreed that 'eResearch increases the productivity of my research group'.

Again, Hellmers (2009) found out that more than 70% of the respondents stated that eResearch is important or very important for future progress in their research fields. Similarly, Dutton & Meyer (2009) reported that a positive attitude towards the role of eResearch in that respondents tend to believe that eResearch does not undermine the quality of research. Additionally, they stated that respondents tend to believe that eResearch enhances both their personal and their team's productivity. The greatest level of agreement (59%) is with the claim that 'Many new scientific questions will require the use of eResearch tools' suggesting a widespread belief among those interested in eResearch developments. However, large proportions of the respondents indicated that they are uncertain about these impacts, saying they 'don't know' or have 'no opinion'.

In Nigeria, Adeagbo et al. (2016) found that ICTs use in research helps in communication with one another in a team, aids in maintaining reference list and items to read, ensure that all know the deadlines for deliverables and sharing relevant new information with each other.

Research objectives

The study specifically sought to do the following:

- To find out postgraduate students' perception towards the use of ICT in research.
- To make recommendation for improvement based on the findings.

METHODOLOGY

The survey design was adopted for the study, for which Stratified, and Convenience sampling techniques were used to select 346 respondents out of 4907 postgraduate students from University of Ghana and University of Cape Coast. Out of the 346 copies of questionnaire administrated, 304 copies were retrieved representing a response rate of 87.7%. The questionnaire was the main data collection instrument and the data collected were analysed using SPSS.

Theoretical framework

The factors influencing the adoption and rejection of new technologies have been of interest to researchers for decades. One of the most popular models that attempt to capture this influence of technologies in the society is Davis' Technology Acceptance Model. The Technology Acceptance Model (TAM) was used to guide the study. TAM is currently the most widely employed model of IT adoption and use. However it has been criticised for the lack of actionable guidance to practitioners (Venkatesh & Bala, 2008). Fortunately, there are many developments and extensions on TAM since its inception in 1989 by Davis to lessen its weakness. These efforts include the extension of TAM to TAM2 which include constructs that moderate the perceived usefulness and TAM3 which combines TAM2 and the model of the determinants of perceived ease of use. In other words, TAM3 is a comprehensive and integrated model of determinants of perceived usefulness and perceived ease of use. Thus, it is a theoretical framework that represents the cumulated body of knowledge over the years from TAM research.

Therefore, in this study, incorporating ICT in one's research is like accepting to use a new technology. The Technology Acceptance Model 3 theorises that the behavioural intention to use a system is determined by two beliefs, namely:

- Perceived Usefulness (PU), defined as the extent to which a person believes that using a system will enhance his job performance (Venkatesh & Bala, 2008)
- Perceived Ease of Use (PEOU), defined as the extent to which a person believes that using a system will be free of effort (Venkatesh & Bala, 2008).

The determinants of PU are subjective norms, job relevance, output quality and result demonstrability, and the determinants of PEOU comprise of computer self-efficacy, computer anxiety and computer playfulness and perceptions of external controls (or facilitating conditions). The theory also adds that perceived usefulness is influenced by perceived ease of use. Guided by the theory (that is TAM3), the research also aimed at establishing how perceived usefulness and ease of use influenced the use of ICT in research.

FINDINGS

Out of the three hundred and four (304) respondents of the public universities as show in Table 1, 196 (64.5%) were males, 92 (30.3%) were females and 16 (5.2%) did not respond to the question. UG has male respondents of 127 (62.3%), female respondents of 62 (30.4%) and 15 (7.3%) not answering of gender. On the other hand, in the case of UCC, male respondents were 69 (69.0%), female respondents were 30 (30.0%) and 1 respondent (1.0%) not answering. This means that most of the respondents were males in both universities.

Gender	UG		UCC		All	
	No.	**%**	**No.**	**%**	**No.**	**%**
Male	127	62.3	69	69.0	196	64.5
Female	62	30.4	30	30.0	92	30.3
No response	15	7.4	1	1.0	16	5.2
TOTAL	**204**	**100.0**	**100**	**100.0**	**304**	**100.0**

Table 1. Distribution of respondents by gender

According to the Table 2, the highest age range is '26-35' with 199 (65.5%) responses whilst the lowest is '56-65' with 1 (0.3%) response. Both UG and UCC had highest responses from the '26-35' age range with 136 (66.7%) and 63 (63.0%) respectively while in UG the lowest response is '56-65' with 1 (0.5%). UCC recorded 'no response' for the group. In UG the response from the '36-45' age range is 32 (15.7%) as opposed to 18 (18.0%) in UCC. The rest of the age ranges that is '25 or under' and '46-55' provided 23 (11.3%) and 12 (5.9%) responses in UG respectively whilst in UCC responses were '25 or under' 15 (15.0%) and '46-55' 4 (4.0%).

Age	UG		UCC		All	
	No.	**%**	**No.**	**%**	**No.**	**%**
25 or under	23	11.3	15	15.0	38	12.5
26-35	136	66.7	63	63.0	199	65.5
36-45	32	15.7	18	18.0	50	16.4
46-55	12	5.9	4	4.0	16	5.3
56-65	1	0.5	-	-	1	0.3
TOTAL	**204**	**100.0**	**100**	**100.0**	**304**	**100.0**

Table 2. Frequency distribution of respondents by age

Table 3 illustrates the responses from each college in both UG and UCC. In UG, most of the respondents that is, 91 (44.6%) were from the College of Humanities. Again, 43 (21.1%) respondents were from the College of Basic and Applied Sciences and College of Health Sciences respectively. Moreover, 27 (13.2%) respondents were from the College of Education. In UCC, 39 (39.0%) respondents were from College of Health and Allied Sciences. Again, 36 (36.0%) respondents were from College of Humanities and Legal Studies. Last but not the least, 13 (13.0%) and 12 (12.0%) respondents were from College of Education Studies and College of Agriculture and Natural Sciences respectively.

	College	**No.**	**%**		**College**	**No.**	**%**
UG	Humanities	91	44.6	**UCC**	Humanities & Legal Studies	36	36.0
	Basic & Applied Sciences	43	21.1		Agriculture & Natural Sciences	12	12.0
	Education	27	13.2		Education Studies	13	13.0
	Health Sciences	43	21.1		Health & Allied Sciences	39	39.0
	TOTAL	**204**	**100.0**		**TOTAL**	**100**	**100.0**

Table 3. Frequency distribution of respondents by college

Postgraduate students' perception towards ICT used in research in Ghanaian public universities.

Respondents were asked to indicate how important the use of ICT in research was to them by their age, gender, college and institution.

Perception of ICT use in research by Age

Table 4 of data represent the perception of postgraduate students toward the use of ICT in research according to their ages.

Table 4: Perception of ICT use in research by Age

Age * Importance of ICT use in research		UG V	UCC V	All **V**	UG I	UCC I	All **I**	UG M	UCC M	All **M**	UG N	UCC N	All **N**
25 or under	No.	23	12	**35**	0	3	**3**	0	0	**0**	-	0	**0**
	%	11.5	12.0	**11.5**	0.0	3.0	**1.0**	0.0	0.0	**0.0**	-	0.0	**0.0**
26-35	No.	127	55	**182**	2	5	**7**	3	1	**4**	-	2	**2**
	%	63.5	55.0	**59.9**	1.0	5.0	**2.3**	1.5	1.0	**1.3**	-	2.0	**0.7**
36-45	No.	30	15	**45**	2	2	**4**	0	0	**0**	-	1	**1**
	%	15.0	15.0	**14.8**	1.0	2.0	**1.3**	0.0	0.0	**0.0**	-	1.0	**0.3**
46-55	No.	11	4	**15**	0	0	**0**	1	0	**1**	-	0	**0**
	%	5.5	4.0	**4.9**	0.0	0.0	**0.0**	0.5	0.0	**0.3**	-	0.0	**0.0**
56-65	No.	1	-	**1**	0	-	**0**	0	-	**0**	-	-	**-**
	%	0.5	-	**0.3**	0.0	-	**0.0**	0.0	-	**0.0**	-	-	**-**
Key:	Very important = V Important = I Moderately important = M No response = N												

Source: Field Data, 2017

Overall, it was realised from Table 4 that majority respondents, that is, 182 (59.9%) between the ages of 26 and 35 indicated that the use of ICT in research was very important while those between ages 56 and 65 that is, 1 (0.3%) of respondent stated that it was very important. Additionally, 45 (14.8%) between the ages of 36 and 45 claimed that the use of ICT in research was very important as opposed to 15 (4.9%) respondents between ages of 46 and 55. A further breakdown shows that those between the ages of 25 and under stated that the use of ICT in research was very important. Comparing institutions' perception, most respondents that is, 127 (63.5%) between the ages of 26 and 35 in UG said that the use of ICT in research was very important compared to 55 (55.0%) in UCC. In contrast, only 1 (0.5) respondent between the ages of 56 and 65 in UG stated that the use of ICT in research was very important however in UCC there was no response. This trend showed that the use of ICT in research is very important to postgraduate students especially among younger students.

Perception of ICT use in research by Gender

Respondents were asked to indicate how important the use of ICT in research is, according to their gender. Table 5 indicates their responses;

Table 5: Perception of ICT use in research by Gender

Gender * Importance of ICT use in research		UG	UCC	All	UG	UCC	All	UG	UCC	All	UG	UCC	All
		V	V	**V**	I	I	**I**	M	M	**M**	N	N	**N**
Male	No.	120	60	**180**	3	6	**9**	2	1	**3**	-	1	**1**
	%	60.0	60.0	**59.2**	1.5	6.0	**3.0**	1.0	1.0	**1.0**	-	1.0	**0.3**
Female	No.	59	25	**84**	1	4	**5**	1	0	**1**	-	1	**1**
	%	29.5	25.0	**27.6**	0.5	4.0	**1.6**	0.5	0.0	**0.3**	-	1.0	**0.3**
No response	No.	13	0	**13**	0	0	**0**	1	0	**1**	-	2	**2**
	%	6.5	0.0	**4.3**	0.0	0.0	**0.0**	0.5	0.0	**0.3**	-	2.0	**0.7**
Key:	Very important = V Important = I Moderately important = M No response = N												

Source: Field Data, 2017

In all, it can be seen from Table 5 that the male respondents that 180 (59.2%) showed that the use of ICT is very important in their research. Comparatively, 84 (27.6%) female respondents indicated that the use of ICT is very important in their research. However, 13 (4.3%) respondents showed that the use of ICT is very important in their research but did not indicate their gender. Moreover, 9 (3.0%) of male respondents stated that use of ICT is important in their research as opposed to 5 (1.6%) of female respondents. Comparing institutions, both UG and UCC had 60.0% male respondents who indicated that the use of ICT is very important in their research whilst female responses in UG and UCC were 29.5% and 25.0% respectively. There is no correlation between gender and perception of the use of ICT in research, as both genders viewed using ICT in research positively. Consequently, it can be argued that gender has no bearing on the use of ICT in research.

Perception of ICT use in research by College

Respondents were asked to indicate how important the use of ICT in research is according to their college. Table 6 indicates their responses;

Table 6: Perception of ICT use in research by College

College * Importance of ICT use in research		UG V	UCC V	All V	UG I	UCC I	All I	UG M	UCC M	All M	UG N	UCC N	All N
Humanities / Humanities & Legal Studies	No.	86	28	**114**	2	6	**8**	2	1	**3**	-	1	**1**
	%	43.0	28.0	**37.5**	1.0	6.0	**2.6**	1.0	1.0	**1.0**	-	1.0	**0.3**
Basic & Applied Sciences / Agriculture & Natural Sciences	No.	40	11	**51**	1	1	**2**	1	0	**1**	-	0	**0**
	%	20.0	11.0	**16.8**	0.5	1.0	**0.7**	0.5	0.0	**0.3**	-	0.0	**0.0**
Education / Education Studies	No.	25	12	**37**	1	1	**2**	1	0	**1**	-	0	**0**
	%	12.5	12.0	**12.2**	0.5	1.0	**0.7**	0.5	0.0	**0.3**	-	0.0	**0.0**
Health Sciences / Health & Allied Sciences	No.	41	35	**76**	0	2	**2**	0	0	**0**	-	2	**2**
	%	20.5	35.0	**25.0**	0.0	2.0	**0.7**	0.0	0.0	**0.0**	-	2.0	**1.0**
Key:	Very important = V Important = I Moderately important = M No response = N												

Source: Field Data, 2017

In general, the responses from Table 6 show that, 114 (37.5%) respondents in the Colleges of Humanities and Humanities & Legal Studies stated that the use of ICT in research is very important while 37 (12.2%) respondents in the Colleges Education and Education Studies indicated that the use of ICT in research is very important. Moreover, 76 (25.0%) respondents in the Colleges of Health Sciences and Health & Allied Sciences said that the use of ICT in research is very important. Again, 51 (16.8%) respondents stated that the use of ICT in research is very important. Additionally, 8 (2.6%) respondents in Colleges of Humanities and Humanities & Legal Studies indicated that the use of ICT in research is important whiles 2 (0.7%) respondents in the Colleges of Basic & Applied Sciences and Agriculture & Natural Sciences; Education and Education Studies; and Health Sciences and Health & Allied Sciences stated that that the use of ICT in research is important respectively. This means that majority of respondents by colleges have high perception of the use of ICT in their research.

Perception of ICT use in research by Institution

Table 7 illustrates the responses received from the respondents when they were asked to indicate their perception of the use of ICT in their research according to their institutions.

Table 7: Perception of ICT use in research by Institution

Institution * Importance of ICT use in research		UG	UCC	All	UG	UCC	All	UG	UCC	All	UG	UCC	All
		V	V	**V**	I	I	**I**	M	M	**M**	N	N	**N**
Institution	No.	192	86	**278**	4	10	**14**	4	1	**5**	4	3	**7**
	%	96.0	86.0	**91.4**	2.0	10.0	**4.6**	2.0	1.0	**1.6**	2.0	3.0	**2.3**
Key:	Very important = V Important = I Moderately important = M No response = N												

Source: Field Data, 2017

Table 7 indicates that, 192 (96.0%) respondents in UG indicated that the use of ICT in research is very important compared to 86 (86.0%) respondents in UCC. In total, 278 (91.4%) respondents in both UG and UCC stated that the use of ICT in research is very important. Moreover, 4 (2.0%) and 10 (10.0%) respondents in UG and UCC respectively stated that the use of ICT in research is important. Furthermore, 4 (2.0%) respondents in UG indicated that the use of ICT in research is moderately important as opposed to 1 (1.0%) in UCC. Again, 4 (2.0%) and 3 (3.0%) respondents in UG and UCC respectively did not respond. It is clear from the analysis that majority of respondents stated that the use of ICT in research is very important.

Satisfaction with ICT Facilities

The researcher asked respondents to point out whether the ICT facilities that their institutions provided met their research needs. Table 8 exhibits the responses;

Table 8: Satisfaction with ICT facilities

Research needs	**UG**		**UCC**		**All**	
	No.	**%**	**No.**	**%**	**No.**	**%**
Yes	150	73.5	47	47.0	197	64.8
No	41	20.0	45	45.0	86	28.3
No response	13	6.5	8	8.0	21	6.9
TOTAL	**204**	**100.0**	**100**	**100.0**	**304**	**100.0**

Source: Field Data, 2017

As can be seen from Table 8, most of the respondents that is, 197 (64.8%) answered in affirmative that the ICT facilities that their institutions provide meet their research needs as opposed to 86 (28.3%) of respondents who responded that they did not. Nonetheless, 21 (6.9%) did not respond to this question. However, in UG the number of affirmative responses that is, 150 (73.5%) were significantly higher than the negative responses 41 (20.0%). On the other hand, in UCC the number of affirmative responses that is, 47 (47.0%) were slightly higher than the negative responses 45

(45.0%). Generally, it is obvious from the analysis that majority of postgraduate students are satisfied with the ICT facilities their institutions provide for them. Nonetheless, Satisfaction with ICT facilities in UG is considerably higher than that of UCC.

Reasons for Using ICT Applications in Research

The respondents were asked to state their reasons for using ICT applications in their research. Table 9 presents the data that was received.

Table 9: Reasons for using ICT applications in research

Reasons for Using ICT	UG		UCC		All	
	No.	%	No.	%	No.	%
Convenient to access	164	81.6	72	72.0	236	77.6
Quick access to information	188	93.5	83	83.0	271	89.1
No need to visit to the library	64	31.8	28	28.0	92	30.3
Currency of information	123	61.2	61	61.0	184	60.5
Saves time	150	74.6	70	70.0	220	72.4
Availability of search tools	134	66.7	49	49.0	183	60.2
Less costly	100	49.8	31	31.0	131	43.1
'Other' reasons	2	1.0	3	3.0	5	1.6

Source: Field Data, 2017

Overall, it was realised from Table 9 that the highest number of respondents used ICT in their research because it was quick access to information compared to 92 (30.3%) respondents who stated that using ICT in their research prevented them from visiting their libraries. Again, 236 (77.6%) respondents indicated that the use of ICT in research was convenient, 220 (72.4%) of them stated that it saved them time while 184 (60.5%) respondents pointed out that it facilitated access to current information. Moreover, 183 (60.2%) respondents asserted that it ensured availability of search tools whilst 131 (43.1%) of them said it was less costly to use ICT in research. It is

clear from the analysis that majority of respondents' access ICT facilities for research because it provided easy accessibility to information.

DISCUSSION OF FINDINGS

The analysis showed that most postgraduate students perceive the use of ICT applications in research as very important. This means that the use of technology in research is essential in 21st century research. This finding is consistent with the findings of Meyer and Dutton (2009) who are of the view that most researchers were interested in using technology for research. This implies that the use of ICT in research was very relevant in their research activities. Postgraduate students in both universities were very receptive in using new technologies to enhance and facilitate their research.

Moreover, majority of the postgraduate students intimated that the ICT facilities their institutions provided met their research needs. This denotes that the use of ICT applications in research was useful. This finding is similar to that of Meyer and Dutton (2009) who noted that researchers believed that ICT facilities used in research foster more collaboration, data sharing and working with large datasets. Thus, academic institutions should provide more ICT facilities to postgraduate students so that they can employ them in their research.

Furthermore, from the data analysis, it was revealed that the main reasons why postgraduate students accessed or used ICT applications are for quick access to information, convenience of access to information, time saving, and currency of information accessed. This supports the findings of Dutton and Meyer (2009) that most researchers used ICT facilities in their research because of ease of use, enhancement of their personal productivity and usefulness in scientific enquires. It is therefore paramount for universities to invest more in ICT infrastructure and facilities that can enhance students and researchers learning and research activities. Additionally,

universities should be more proactive in identifying postgraduate students research needs so that relevant ICT applications can be provided.

CONCLUSION AND RECOMMENDATIONS

The study found out that most postgraduate students indicated that the use of ICT in research was very important irrespective of their age, gender, college and institution. Moreover, most of the respondents responded affirmative that the ICT facilities their institutions provided met their research needs. Again, most respondents used ICT in their research because it ensured quick access to information, convenient access to information and saves time.

In conclusion, the use of ICT in research had become an important facility in postgraduate students' education in terms of getting access to better storage media, improved data analysis technologies, citation and compiling bibliographies, and publishing. For this reason, academic institutions should invest in ICT facilities that are relevant in postgraduate students' research work. There should also be regular training programs such as seminars and workshops for postgraduate students in the use of ICT applications like OPAC, NVivo, Institutional repositories (ICT) and video conference. This will help them perceived ICT tools use in research as useful and easy to use.

Last but not the least, this study sought to find out perception and attitude towards ICT use in research by postgraduate students in Ghanaian public universities and made recommendations based on the findings. The study could be replicated in private universities in Ghana to confirm the findings of this study.

The study found out that the ICT facilities that the universities provided met postgraduate students' research needs. Thus, universities should maintain the already existing ICT facilities. However, they should ensure that all ICT facilities are monitored and maintained from time to time to gauge their usefulness.

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