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Strategies for Enhancing the Utilization of Information and Communication Technology (ICT)-Based Library Resources in Research

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Abstract

This study was conducted to investigate the problems that hinder the utilization of Information and Communication Technology (ICT)-based library resources for postgraduate research in Nigerian Universities (federal, state, and private). Four objectives and four research questions guided the study. A sampling technique was used in carrying out the work. A total number of five hundred and ten (510) respondents were used for the study. The instruments for data collection were questionnaire and observation checklist. Five hundred and ten (510) copies of the questionnaire were distributed to the postgraduate researchers at the three universities in the South East Nigeria and three hundred and sixty-six (366) were returned representing 72% return rate. The following statistical measures were employed for the data analysis: frequency table, mean (X) and Standard deviation (SD). The findings revealed that there was no significant difference in the mean ratings of postgraduate researchers in Federal, State and Private universities on the problems that hinders utilization of ICT-based library resources for research. However, the findings also revealed that postgraduate student's lack of fund, high cost of internet use, the incompetence of library

staff, lack of access to ICT resources, lack of ICT skills by users and lack of awareness of ICT-based library resources are some of the challenges affecting the use of ICT-based library resources. Based on the findings, it was recommended that university libraries should make the cost of ICT-based library resources affordable; update the skills of librarians on ICT-based resources; educate the postgraduate research students on the use of ICT-based library resources and make university websites freely available to the postgraduate student researchers.

Keywords: Research, ICT-based Library Resources, Engineering, Education, Social Sciences, University of Nigeria.

INTRODUCTION

Information and Communication Technology (ICT) is daily giving birth to new concepts, new products, and new ideas. It transforms not only industries and business but also other aspects of life activities such as educational research (ICT library resources). Numerous problems have been militating against the utilization of these ICT-based library resources. Many reasons have been attributed to the non-availability and under utilization of ICT library resources in school and public libraries. The authors have given various reasons for this; however, each reason differs based on the situation surrounding each of the libraries. The top on the list of problems plaguing ICT library resource utilization has been the issue of fund. This was noted from Kisiedu (1999) account of a survey of the situation among University Libraries in Africa, undertaken by the London-based International African Institute (IAI). The report encapsulates a number of problems such as gross under-funding, inadequate ICT infrastructure, donor-dependency, poor collections and high postage/delivery charges as some of the constraints that have militated against document delivery as an alternative to large core collections in sub-Saharan African University Libraries. The basic problem here is lack of funding because it is when funds are available that ICT infrastructure can be procured and high quality collections can be made. Funds form the basic requirements in order for the library to make available any resources before we now talk of its utilization. This is to say that lack of funds prevent collection of library resources. Going by the idea of those authors collection precedes availability and availability precedes utilization. So any problem that hinders collection will surely affect utilization. That is the reason why librarians need to face the problems of collection first, to ensure that the library resources are there in the library before thinking of utilization. The above obstacle to the use of library resources was noted by Erens (1996) when he said that inadequate library collections is a problem in the use of the libraries. He said as well that access to important journals is increasingly difficult. This has caused a decline in satisfaction with libraries.

The initiatives in Nigeria's university system are a recent development (ICT-based library resources) and are changing the culture of research, knowledge production and dissemination and this seems to pose serious challenges (such as ability to use computer in accessing, manipulating, and evaluating electronic information resources and devices) to students in

their utilization of ICT-based library resources in Nigerian universities. These challenges call for an empirical study to analyze the situation for in-depth understanding of the issues at play with a view to devising appropriate measures to be taken to address observed deficiencies.
Therefore, the purpose of this study is to:

(1) Find out the influence of University ownership status (Federal, State, and Private) on the extent of utilization of ICT-based library resources for postgraduate research.
(2) Ascertain the influence of area of study specifically the Faculties of Education, Social Science, and Engineering on the extent of utilization of ICT-based library resource for postgraduate research.
(3) Determine the problems associated with the utilization of ICT-based library resources for postgraduate research.
(4) Ascertain ways to enhance the utilization of ICT-based library resources for postgraduate research in the libraries.

In the light of the foregoing discussions and purpose of study, the following research questions were formulated to guide the study:

1) How does the University ownership Status (Federal, State and Private) influence the extent of utilization of ICT-based library resources for postgraduate research?
2) What is the influence of area of study represented by faculties (Faculty of Education, Social Science and Engineering) on the extent of utilization of ICT-based resources in postgraduate research?
3) What problems are encountered in the utilization of ICT-based library resources for postgraduate research?
4) What are the possible ways to enhance utilization of ICT-based library resources for postgraduate research?

The findings from this study on the problems of postgraduates' use of ICT-based library resources in their research would be significant in the formulations of ICT-based library resources use policy. It will also show data on the problems hindering the utilization and strategies for enhancing ICT-based library resources in research. By revealing the challenges involved, the study will create incentives for university funding bodies, university's management, external donors and the individual researchers to invest in ICT-based library resources. Data to be generated from the study will add to the pool on ICT research in respect of the problems hindering the utilization and strategies for enhancing ICT-based library resources in research. The research outcome will further inform both the lecturers and supervisors of postgraduate researchers about the challenges faced by the students regarding ICT-based library sources of data for research and how to address those challenges.

Theoretical Framework

The theoretical framework this present study underpinned on is the Drive–Reduction Theory which was propounded by Hull in 1884. According to Hull, learning becomes meaningful only when it satisfies the needs of children. Hull's story is explained in general rules as: the law of habit formation; the reaction potential; stimulus generalization; and primary motivation or drive among others. Hull's theory threw light on learning process. He related learning to the needs of the organism. Hull explained that the needs of categories of children

should be incorporated in the curriculum. The most important contribution of Hull's story is that it described learning in quantitative terms. In the present study the Hull's story is relevant because, it has provided an understanding of the need to examine the level of utilization of ICT-based library resources in University libraries for postgraduate research, ICT and effective communication of usernames and passwords. These measures if adopted will go a long way in ameliorating the problems associated to the use of e-library resources and help the users to make maximum use of them. The problems confronting the use of library resources will be reduced and users will gain the best advantage from the libraries if the suggestions can be well implemented. In like manner, the problems that confront the utilization of ICT-based library resources in postgraduate research will be examined in this paper.

Literature Review

ICT-based Library Resource Problems

With regard to the problems affecting the use of library resources, Agaba (2005) studied that of electronic library resources and submitted that most of the respondents who has not utilized electronic information resources mentioned that they had no access to the services. Some indicated that they did not know what electronic information resources were, and hence could not use them. Other respondents mentioned lack of facilities to use and lack of time as limitations. Some categories of non-users were completely not aware of these resources and actually needed more information about them. Some had reasons like overcrowding in the library computer laboratory, failure to get a password from the library staff, lack of information about electronic information resources, and lack of familiarity with the resources as the hindrances they have in utilizing library electronic resources. Other factors discovered by the same author (Agaba, 2005) as hindering the use of ICT library resources is the location of some faculties. The author gave an example of the faculties of Veterinary and Human Medicine and others in their Institution that is far from the University Library. Other problems highlighted by the author include lack of fixed schedules for computer laboratories; centralization of the resources; lack of time; irrelevance of the databases; limited subscription to databases; poor packaging of information; library's preference for cheaper electronic information resources; limited accessibility to databases through use of passwords; restriction on use of diskettes for information retrieval; and brevity of information. The least mentioned factors were laziness, inability to print from the library, and limited funding from the University to avail every department the needed facilities.

In view of the digitization of library in higher institutions many studies were conducted on the use of electronic library resources. Thus in another study conducted by Agaba (2004) he reported that the challenges to the utilization of electronic information resources by academic staff are the inadequacy of facilities for use. It was mentioned as the biggest problem users faced, leading to congestion. Poor computer communication systems were mentioned, with some respondents taking poor bandwidth as leading to poor utilization of the resources. The increased use of ICT for communication purposes and infrastructure were problems responsible for poor communication service of the E-library resources. The report also revealed that most respondents had not heard about electronic document delivery services.

Centralized utilization of electronic information resources was cited as one of the issues inhibiting the use of those resources. Those interviewed suggested that the introduction of the Local Area Network (LAN) would go a long way to solve this problem. Unstable internet facilities, limited access to some sites, inadequate time schedules for individual departments that were accessing these resources from the University Library, were mentioned as some of the factors. Some lecturers for example mentioned that "biological abstracts relevant to their field of study" were not available, concluding, "There were no relevant databases that suit information needs". As mentioned earlier, the study revealed that few of the respondents were beginners in computer use. It is no wonder, therefore, that poor computer skills was of the problems cited. Some raised the issue of location of faculties, space limitations, poor publicity by the University Library, printing costs, restrictions on use of diskettes, unnecessary erasure of mails, and lack of time as the problems affecting their use of e-library resources. Another reason users generally complained of for non-use of electronic journals is: non-availability of backup volumes in electronic journals and the impossibility of using electronic journals physically at different places. Most users mentioned that they used electronic journal mainly from their libraries and preferred the print in the libraries. There are problems like frequent changes in ICT and absence of technical support (Ikem and Ajala, 2000). The above is an array of problems that are widely notable as associated with the use of electronic library resources. These problems are not limited to the surveyed university alone but almost all universities with electronic library resources.

However, problems that affect the use of ICT-based library resources in general were highlighted by Ikegbune (1994) as the hindrance to library resources by saying that academic libraries have many common characteristics which also implies that they have many problems in common about the use and availability of their resources. Among the problems he highlighted as facing the use of library resources are:

- The tremendous growth in student enrollment, which place additional demand for materials, services and facilities on already overburdened library staff.
- The rapid expansion of knowledge, which has resulted in a deluge of new publications in many new forms and has produced problems of selecting the most useful materials from the great numbers which are available.
- The need for quicker and more effective means of bibliographic access to these publications.
- The increasing cost of library materials without comparable library budget.
- The many new course offerings and the resulting need for new kinds of materials and for the equipment for using them.
- The growing emphasis on high quality in education and on the fostering of independent study and inquiry, which has brought forth new programmes and methods of instruction calling for heavy use of library materials.
- The urgent need for larger numbers of professional librarians as well as for non professional supporting staff.
- The need for better facilities.
- The inadequacy of library resources to meet the need of current programmes.

Moreover, Echezona (2005) identified other problems militating against the effective use of library resources as poor use of information technologies, reliance on the improper medium of scientific information and wrong search pattern. The problems of utilization of ICT-based library resources is not only associated with the resources itself but, the environment where it is being made use of also contributes a lot to the success of the utilization of the resources. Therefore, the sitting, safety, lighting and other fixtures within the library environment plays a vital role. Libraries are not always safe and secure places and they are facing a wide variety of security concern which includes the theft and mutilation of library materials (Rathinasabapathy and Amudhavalli, 2006). Another aspect of the environmental factor that hindered the use of library resources was raised by Alabi (1993). According to him, insufficient power supply, low quality telecommunications facility, lack of trained manpower with the required skills for library automation and acute shortage of fund which would have been used to ameliorate the impact of these problems.

Concerning environmental problems and starting with location problems, Attama (2005) explained some problems which are hampering the availability of ICT-based library resources in higher institutions in Nigeria. These are:

- The situation where libraries are housed in temporary and shanty quarter. The author noted that in this state of affairs, effective use of library resources cannot be guaranteed. Some of these buildings may equally be unsuitable located, some new workshops, student hostels and noise prone areas such as main roads and canteens. The consequence is poor concentration and understanding by users of the libraries and the performance of the staff in information service is also hampered.
- The negligence of many school administrators and their inability to appreciate the importance of libraries in the implementation of their institutional goals. This has resulted in the inability of the administrators to grant the basic needs of libraries in the area of staff. Thus, there are inadequately trained professionals and non professionals in libraries across the countries. This has caused offering of minimal service which are not compatible with the needs of users.
- The relegation of audio-visual facilities such as video tapes and video recorders, slides, radio-cassettes, television sets projectors in the background. Also many libraries do not have a unit or section of audio visual material.

Another issue facing the utilization of ICT-based library resource is the problem of the librarians themselves not well acquainted with the resources. This problem was hinted in the statement of Manning (2000) which complained that library managers and staff throughout are faced with the task of becoming familiar with e-resources. This problem pose a serious hindrance to the use of library resources in the sense that when the librarians who are suppose to assist the users are not well accustomed to the resources it will be difficult for them to help the users thus implying ineffective utilization of the resources in the library. The list of problems confronting the use of the library and its resources is inexhaustible, however an array of those problems have been discussed above with reference to the reports given by scholars. Thus, the problems of library utilization usually start from the foundation of the paucity of fund to provide the needed library facilities and resource, it from there proceeds to the various issues of ineffective of the resources to meet the need of the user due to one

reason or the other. Therefore, the problem of utilization of library ICT resources is like a web which one problem links or generates the other. Owing to these enormous obstacles to the effective use of library resources, it is then necessary to seek for means of surmounting these problems to enhance the full utilization of library resources to the overall advantage of the users. This study will ascertain the problems that hinder the utilization of ICT library based resources on postgraduate research in Nigerian Universities.

Strategies for Enhancing the Utilization of ICT-based Library Resource

Owing to the numerous problems facing the utilization of libraries, authors have suggested various ways by which the problems affecting the use of ICT-based library resources can be reduced to enhance the use of libraries. The library environment is the first motivator that will attract the users to the library. This gives the reason why Ajayi and Adetayo (2005) suggested that the library environment should be made more pleasant and comfortable.

A list of solutions to problems of ICT-based library resources utilization was given by Echezona (2005). He opined that both availability and access to library resources will be enhanced if the following were taken into consideration: - provision of both printed and electronic information resources.

- Provision of need based education programme by the library for easier exploitation of available resources.
- Provision of on-line materials in electronic format.
- Updating the skills of library staff to enable them to help users.
- Improving the funding of the library to enable it to purchase and maintain needed information technology, books, journals and audio-visual resources.

Ikegbune (1994) also gave the solution to the problems facing accessibility of ICT-based library resources to be – provision of more space for library's active collection and for storage of little used materials.

- Larger and better-trained staff member with more subject competencies to explain resources, prepare bibliographies, and locate materials in other libraries and
- Participation in more cooperative activities in the acquisition and dissemination of materials.

The problem of inadequate awareness was addressed by Popoola (2008) recommendation that library management in Nigerian Universities should create Faculty awareness about the available information product and services. This according to him could be done through planned public relations programmes, library week, study tours, user education programmes, library exhibitions, organization of seminars, symposia and workshops, library awards night, librarian making contact with the Faculty staff and improve communication links with the latter. The author also suggested that library must constantly update and weed its outdated and non-useful collection. The update of library collection will make the library to be current in the information it provides for its users therefore enriching their knowledge. Commenting more on the need for proper orientation on library use Sheeppke (1994) asserted that librarians can help motivate the use of the library by advertising the library they worked in as "learner friendly" to those who do not know how to search. The author believed that libraries should also try to appeal to users need by being more diverse and individualistic. This will

entail that the librarians recognize individual differences in the users that patronize their library and as such try to understand each user and be patient with them.

Maliki and Uche (2007) also found out that not only the learners but also their parents and the circumstances of their existence place a consideration impact on the learner's ability to utilize ICT-based library resources. They therefore encouraged parents to lay proper foundation for their children's school learning, socioeconomic strata notwithstanding. They believed that if the home provides the necessary level of cognitive stimulation which the learner requires at different stages of development, the reading culture will be cultivated early in life. The hunger for printed materials will be created and utilization of the library and its abundant resources will just follow a natural course, for the enhancement and intellectual development of the learners.

The problem of inadequate fund was addressed by the suggestion of Igbo and Dike (2006). It is their believe that the problem of unavailability library resources was due to lack of high funds. They therefore advised that academic libraries be funded directly by the government instead of the libraries receiving their subvention from the university authority. This, the author believed will make the university librarians to be accountable for the fund they receive. They also advised that libraries should engage in a local income generating venture to augment the government allocations which are never sufficient. This they believe can be done through production/sales of such items as bags, notebooks, T-shirt bearing library Logo. Also, the library bindery could undertake commercial binding ventures such as binding of student's projects and other materials as well as lamination of important documents.

Ogbonna (2005) also gave measures which can be to enhance the utilization of microforms which can also be adopted to enhance the utilization of other library resources. The measures the author gave are: putting into use the available microforms; the location and organization of microforms in the library should be user friendly; training and retraining of staff on the use of microforms should be practiced; and lastly funding of the libraries should be improved. The author concluded by encouraging the librarian to have a positive change of attitudes towards microforms as they noted that this would encourage the availability and use of the resources in the librarians. The suggestions of the author lay much emphasis on the use of microforms; however, it is believed that any measures that can be used to curb the problem affecting the use of microforms can also be applied in solving the problems affecting the use of other library collections. As regards the training of staff, it is important that every library staff to be trained and re-trained on the use of all library resources. In addition, library staff ought to be sent on improvement courses for them to update their knowledge on how to handle some modern library facilities and resources. This is especially necessary in this modern age where new information technologies are being developed every day. Providing solutions to the problems affecting the use of electronic library resources, Agaba (2004) suggested provision of adequate Information and Communication Technology (ICT), decentralization of service provision, increased marketing strategies, training staff in information and Communication among others.

Research Model

The research model adopted for this study is based on the Diffusion of Innovation Theory (DOI). The proposed model is shown in Figure 1 of appendix A. The research model proposes that there exist some relationships and interactions between some variables and utilization of ICT-based library resources by postgraduate researchers in Nigerian universities. First, it is proposed that University status and discipline of study correlate with utilization of ICT-based library resources by postgraduate researchers. Second, it is proposed that the relationship between University status and discipline of study would predict utilization of ICT-based library resources by postgraduate researchers in universities (federal, state, and private) located in south-east Nigeria.

METHODOLOGY

Hypotheses

The following null hypotheses have been formulated to guide the study and will be tested at 0.05 level of significance.

Ho_1: There is no significant relationship between the university status (Federal, State and Private) and their utilization of Information and communication Technology-based library resources in universities in South-East Nigeria.

Ho_2: There is no significant relationship between the postgraduate researchers' areas of studies (Education, Social Sciences, and Engineering) and their utilization of Information and communication Technology-based library resources for research in universities in South-East Nigeria.

Ho_3: The university status (Federal, State, and Private) and Faculty affiliation (Education, Social Sciences, and Engineering) have no significant joint influence on postgraduate students' utilization of Information and communication Technology-based library resources for postgraduate research in universities in South-East Nigeria.

Materials and Methods

The study was carried out in South East Zone of Nigeria. The states in the South East include Abia, Anambra, Ebonyi, Enugu and Imo States. In the area, there are five (5) Federal Universities, five (5) State Universities and seven (7) Private Universities as shown in appendix B. The selected Universities are federal–University of Nigeria, Nsukka, in Enugu State; State – Ebonyi State University, Abakiliki, in Ebonyi State; Private – Madonna University, Okija in Anambra State in the south-east of Nigeria. The selection was done based on the universities that run postgraduate studies and availability of ICT-based library resources. The problems of utilization of ICT-based library resource in these university libraries by their postgraduate or research students were investigated. The Universities considered here are federal (University of Nigeria, Nsukka), State (Ebonyi State University, Abakiliki), and private (Madonna University, Okija Anambra). The area of study is considered appropriate because of the large number of postgraduate students and availability of ICT-based library resources in the universities within the area.

Sample and Sampling Techniques

Three (3) universities comprising of one federal universities, one state and one private university each were sampled from the 17 (seventeen) universities in South East Zone. This was done using a simple random sampling technique. The selected universities, their status and state of location are shown in appendix B. From each sample university, three (3) faculties were sampled using purposive sampling technique. The faculties of Education, Social Sciences, and Engineering were sampled for the study. The choice of these facilities for the study was based on the fact that they (Education, Social Sciences, and Engineering) generate the highest number of postgraduates' in Nigerian universities (Ovute and Ugwuanyi, 2011). The sampled faculties yielded the following number of postgraduate students: Education - 96; Social Sciences - 155; and Engineering - 115). These were postgraduate students who were registered and carrying out research in their respective universities at the time of the data collection. In all, three hundred and sixty-six (366) postgraduate students were sampled for the study.

Instrument for Data Collection

The instruments used in data collection include a questionnaire called Problems and Ways to Enhance the Utilization of ICT-based Library Resources Questionnaire (PWEUICTBQ). It was developed by the researchers. The instrument is divided into two sections, A and B. Section A elicits information on the personal data of the respondents in respect of status of university (Federal, State or Private) and Faculty of the postgraduate students (Education, Social Science, or Engineering). Section B is subdivided further into 3 parts as follows: Part 1 seeks information on the extent of utilization of ICT-based resources available in the University; Part 2 seeks information on the problems that hinder the utilization of ICT-based library resources; while Part 3 is designed to collect data on the ways to enhance the utilization of ICT-based library resources in university libraries for postgraduate research. The information on problems hindering the utilization of ICT-based resources and the strategies for enhancing the utilization of ICT library resources in the universities were framed on a four-point modified Likert – type scale using the responses of Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1) point, respectively (See appendix C). Likert – type scale using the responses of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) were used for the Mean and Standard Deviation of Respondents ratings on the Problems Encountered in Utilization of ICT-Based Resources and in the Ways to Enhance Utilization of ICT-Based Resources in Postgraduate Research.

RESULTS

Table 1 shows that out of the total of 510 questionnaires administered, only 366 (72%) were successfully returned. Of this number, according to category of respondents, 140 questionnaires were administered to faculty of Education but only 96 were returned, 200 to faculty of Social Sciences but only 155 were returned, while the faculty of Engineering received 170 but only 115 were returned. In real numbers, faculty of Social Sciences returned the highest number, followed by the faculty of Engineering with 155 and 115, respectively. Distribution and return by institutions shows that 115 went to federal university but only 113

were returned while the state university received 225 but only 128 were returned. Similarly private university got 170 with 125 returned.

Table 1: Distribution and Return by Universities and Faculties

	Number of Questionnaire Administered	**Number of Questionnaire Returned**	**Number of Questionnaire not Returned**
University			
Federal	115	113	2
State	225	128	97
Private	170	125	45
Total	510	366	144
Faculty			
Education	140	96	44
Social sciences	200	155	45
Engineering	170	115	55
Total	510	366	144

The data on this sub-section were used to answer question one: how does the university status (federal, state, and private) influence the extent of utilization of ICT-based library resources for postgraduate research? The results on Table 2 show the extent to which researchers utilize ICT-based library resources by the three categories of Universities by the mean and standard deviation on each of twenty-two items. Comparing strictly among the three universities, the result shows that the private university has the highest number of items utilized followed by state university and finally federal. The private university scored highest on sixteen items utilized. They are library website, Usenet news group, tele-access, tele-presence, auditing web document, information technology assisted project based learning (PBL), Computer, Laptops, online catalogue, Library website, E-learning/Discussion, Web document E-library and e-book, internet, Usenet News group; while state scored highest on the remaining six items utilized (Telecommunication resource, Fascine (online printing, Machine readable resources e.g. CD-rom. Bar-Code Reader, Close circuit TV (network) Usenet net group, whereas federal scored all low.

Table 2: Mean and Standard Deviation of the Respondents' Rating on the Influences of University (Federal, State, and Private) Status on Utilization of ICT-Based Library Resources for Postgraduate Research

S/N	**Items**	**Federal**		**State**		**Private**		**Total**	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
1	Computer	2.58	0.943	2.66	1.125	2.66	1.137	2.63	1.074
2	Laptops	2.54	1.009	2.81	0.978	2.82	0.951	2.73	0.984
3	Online catalogue	2.15	1.002	2.60	0.999	2.60	1.024	2.46	1.027
4	Library Website	2.31	1.070	2.62	0.981	2.50	1.060	2.48	1.041
5	E-Learning /Discussion group	2.27	1.052	2.41	1.180	2.35	1.102	2.34	1.114
6	Web document	2.06	1.011	2.16	1.107	2.19	0.965	2.14	1.029
7	E-Library and e-Book book	2.19	1.082	2.12	1.055	2.22	1.097	2.17	1.075
8	Internet	2.06	1.038	2.12	1.072	2.17	1.148	2.12	1.086
9	Usenet news group	2.02	1.052	2.22	1.086	2.18	1.132	2.14	1.092

10	Tele-communication facilities resources	2.37	1.019	2.60	1.045	2.50	0.956	2.50	1.009
11	Networks	2.23	0.991	2.45	1.071	2.62	1.045	2.44	1.047
12	Resources sharing and collaboration on project	2.29	1.083	2.62	1.043	2.75	0.913	2.56	1.028
13	Telephone	2.79	1.004	2.84	0.970	2.94	0.978	2.86	0.983
14	Television	1.98	1.061	2.36	1.155	2.42	1.158	2.26	1.141
15	Radio	3.28	0.959	3.41	0.883	3.46	0.894	3.39	0.911
16	slides	2.59	1.091	2.70	1.146	2.88	1.013	2.73	1.088
17	projector	2.53	1.134	2.70	1.097	2.84	0.995	2.70	1.079
18	Fascine (online printing)	2.70	1.076	2.93	1.005	3.05	0.991	2.90	1.030
19	Machine readable resources e.g. CD-Rom	2.93	1.067	3.20	1.007	3.31	0.962	3.16	1.021
20	Reprographic resources (e.g photocopying machine)	3.17	1.034	3.35	0.961	3.62	0.656	3.39	0.911
21	Bar Code Reader	3.38	0.948	3.44	0.911	3.59	0.697	3.47	0.849
22	Close circuit T.V (Network)	3.25	1.014	3.22	1.003	3.41	0.890	3.29	0.970

The data on this sub-section were used to answer question two: what is the influence of area of study represented by faculties (Education, Social Sciences, and Engineering) on the extent of utilization of ICT-based library resources in postgraduate research? The results on Table 3 show the extent to which researchers utilize ICT-based library resources by the three faculties by the mean and standard deviation on each of twenty-two items. Comparing strictly between the three faculties, the result shows that Faculty of Education has the highest number of ICT-based library resources utilized followed by Engineering and finally Social Sciences. The Faculty of Education scored highest on fifteen items utilized. These are computer, laptop, online catalogue, library website, E-learning/discussion group, Usenet news group, web document, E-library and e-Book, Internet, world wide web, CD-ROM resources, Reprographic resources, Tele-communication, Fascine (online printing machine), and E-mail; while Engineering had the highest utilization on six items (E-learning/discussion group, collaboration on project, slides, projector, assisted project based learning (PBL), Bar-code reader, close circuit T.V (Network), and Machine readable resources); whereas Social Sciences scored highest only on (E-library and E-book).

Table 3: Means and Standard Deviation of Respondents Rating According to Area of Study (Faculties of Education, Social Sciences, and Engineering) on Extent of Utilization of ICT-Based Library Resources in Postgraduate Research

S/N	**Items**	**Education**		**Social Sciences**		**Engineering**		**Total**	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
1	Computer	2.81	0.998	2.60	1.079	2.52	1.119	2.63	1.074
2	Laptops	2.84	0.977	2.72	1.016	2.65	0.946	2.73	0.984
3	Online catalogue	2.56	1.054	2.39	0.977	2.47	1.071	2.46	1.027
4	Library Website	2.56	1.044	2.50	0.976	2.40	1.122	2.48	1.041
5	E-Learning /Discussion group	2.58	1.185	2.26	1.099	2.25	1.050	2.34	1.114
6	Web document	2.23	1.119	2.15	0.959	2.06	1.045	2.14	1.029
7	E-Library and e-Book book	2.24	1.064	2.15	1.094	2.14	1.067	2.17	1.075
8	Internet	2.15	1.105	2.08	1.066	2.16	1.105	2.12	1.086
9	Usenet news group	2.22	1.135	2.09	1.071	2.16	1.089	2.14	1.092
10	Tele-communication facilities	2.60	1.041	2.48	0.956	2.43	1.052	2.50	1.009

	resources								
11	Networks	2.45	1.085	2.39	0.984	2.50	1.103	2.44	1.047
12	Resources sharing and collaboration on project	2.58	1.111	2.48	1.015	2.65	0.974	2.56	1.028
13	Telephone	2.96	1.025	2.72	0.979	2.93	0.943	2.86	0.983
14	Television	2.41	1.236	2.04	1.056	2.44	1.125	2.26	1.141
15	Radio	3.50	0.808	3.34	0.950	3.36	0.938	3.39	0.911
16	slides	2.72	1.073	2.63	1.094	2.88	1.085	2.73	1.088
17	projector	2.70	1.144	2.57	1.044	2.86	1.059	2.70	1.079
18	Fascine (online printing)	2.98	1.086	2.85	0.966	2.90	1.071	2.90	1.030
19	Machine readable resources e.g. CD-Rom	3.28	0.948	3.06	1.027	3.18	1.064	3.16	1.021
20	Reprographic resources (e.g photocopying machine)	3.56	0.751	3.28	0.990	3.39	0.905	3.39	0.911
21	Bar Code Reader	3.52	0.781	3.48	0.906	3.47	0.862	3.47	0.859
22	Close circuit T.V (Network)	3.46	0.870	3.15	1.027	3.34	0.954	3.29	0.970

The data presented in Table 4 was used to answer research question three, problems associated with the utilization of ICT-based resources in postgraduate research in Universities by researchers. In order of magnitude in descending order, respondents reported that Postgraduate students' lack of fund as the biggest problem ($\bar{x}$ = 2.90; SD = 0.971), followed in by high cost of internet use ($\bar{x}$ = 2.68; SD = 1.112), and non competent library staff ($\bar{x}$ = 2.66; SD = 1.065). The fourth major problem was lack of access to ICT-based resources in the university library ($\bar{x}$ = 2.58; SD = 1.008). The fifth problem is the respondents' perception that they lack knowledge of websites for locating exactly what they want ($\bar{x}$ = 2.52; SD = 1.020). Other problems of significant magnitude reported by respondents include, lack of competence in ICT usage ($\bar{x}$ = 2.47; SD = 0.997) and lack of awareness of ICT-based library resources ($\bar{x}$ = 2.46; SD = 1.091).

Table 4: Mean and Standard Deviation of Respondents ratings on The Problems Encountered in Utilization of ICT-Based Resources in Postgraduate Research

S/N	**ITEM**	**Frequency**						
		SA	**A**	**D**	**SD**	**Mean**	**SD**	**Remark**
1.	Postgraduate students lack of fund to use ICT-based information services.	118	132	78	38	2.90	0.971	Agreed
2.	The cost of internet search for research is very high for Postgraduate students.	109	108	72	77	2.68	1.112	Agreed
3.	The university library staff do not possess the competency for guiding students on ICT-based resources	99	112	88	67	2.66	1.065	Agreed
4.	The students lack access to ICT-based resources in a university library.	75	130	95	66	2.58	1.008	Agreed
5.	Postgraduate research students lack knowledge of websites for locating appropriate person or group or materials on the net	78	99	123	66	2.52	1.020	Agreed
6.	Postgraduate students lack competence in ICT-based resource usage.	58	134	96	78	2.47	0.997	Agreed
7.	Postgraduate students lack awareness of ICT-based library resources	79	102	92	93	2.46	1.091	Agreed

8.	Postgraduate students do not posses computer for use.	68	94	105	99	2.36	1.070	Not agreed
9.	Information got from ICT-based research is not reliable	56	52	127	131	2.09	1.052	Not agreed
10.	ICT-based library search is time wasting	50	59	102	155	2.01	1.065	Not agreed

The data presented in Table 5 was used to answer research question four, "What are the ways of enhancing the utilization of ICT-based library resources for postgraduate research in Nigeria Universities?" Respondents mean score for each of the seven (7) items in this subsection were calculated and limit of real numbers were used to test significance. The overall result indicates that there is significant agreement by respondents on these strategies/ways enumerated for the utilization of ICT-based library resources for postgraduate research by researchers. Furthermore, the results for each of the items were significant using the limit of real numbers. Arranged in order of importance, respondents ranked the strategies as follows: Training of university librarians on ICT facility utilization ($\bar{\times}$ = 3.44; SD = 0.841), Library staff should be skilled in ICT-based library resources ($\bar{\times}$ = 3.39; SD = 0.895), and a course on ICT utilization of research studies be mounted for postgraduate degree programme ($\bar{\times}$ = 3.37; SD = 0.849) as the top three strategies.

Table 5: Mean and Standard deviation of Respondents Rating on Ways to Enhance Utilization of ICT-Based Resources

S/N	**ITEM**	**Frequency**						
		SA	**A**	**D**	**SD**	**Mean**	**SD**	**Remark**
1	Training of university librarians on ICT facility utilization.	223	105	15	23	3.44	0.841	Agreed
2	Library staff should be skilled in ICT-based library resources.	216	103	19	28	3.39	0.895	Agreed
3	A course on ICT utilization for research studies be mounted for postgraduate degree programme	201	122	20	23	3.37	0.849	Agreed
4	The cost of utilizing ICT facilities for postgraduate research in university libraries be made free.	202	108	30	26	3.33	0.902	Agreed
5	The cost of using the internet for postgraduate research should be subsidized by the institution concerned.	173	125	41	27	3.21	0.915	Agreed
6	Postgraduate students should be linked directly to the internet by university administration.	164	135	38	29	3.18	0.915	Agreed
7	Laptops and palmtop computers should be provided for postgraduate students at subsidized rate	176	112	42	36	3.17	0.981	Agreed

Hypothesis One

There is no significant relationship between the postgraduate researchers' university status (Federal, State and Private) and their utilization of Information and Communication Technology based library resources for postgraduate research in the universities located in South-East Nigeria.

Table 6 shows that the F calculated (4.826) was greater than P-value (0.009). The null hypothesis was therefore not accepted. In other words, there is significant difference in the mean ratings of postgraduate students in Federal, State and Private universities on the utilization of ICT-based library resources for postgraduate research.

Table 6: Analysis of Variance (ANOVA) of the Mean Difference in Ratings of Postgraduate Students from Federal, State and Private Universities

ANOVA

	Sum of Squares	df	Mean Square	F	P-value
Between Groups	1838.345	2	919.172	4.826	0.009
Within Groups	69137.874	363	190.462		
Total	70976.219	365			

Hypothesis Two

There is no significant relationship between the postgraduate researchers' areas of studies (Education, Social Sciences, and Engineering) and their utilization of Information and communication Technology based library resources for research in the universities located in South-East Nigeria. Table 7 result shows that the F-ratio calculated (1.911) was greater than the significant value (0.149). Thus, the null hypothesis is not accepted. In other words, there is significant difference in the mean ratings of postgraduate researchers in Faculties of Education, Social Sciences and Engineering on the extent of utilization of ICT-based library resources for postgraduate research.

Table 7: Analysis of variance (ANOVA) of the Mean Difference in Rating of Postgraduate Students from Various Faculties (Education, Social Science, Engineering) on the Extent of Utilization of ICT-Based Resources

ANOVA

	Sum of Squares	df	Mean Square	F	P-value
Between Groups	739.537	2	369.769	1.911	0.149
Within Groups	70236.681	363	193.489		
Total	70976.219	365			

Hypothesis Three

Postgraduate researchers' university status (Federal, State, and Private), and faculties (Education, Social Sciences, and Engineering) have no significant joint influence on their utilization of Information and communication Technology based library resources for research in universities in South-East Nigeria. The result presented in Table 8 indicates that the F-ratio calculated (0.133) was less than the Table F (0.875). Hence the null hypothesis was accepted. In other words, there is no significant difference in the mean ratings of postgraduate researches in Federal, State and Private universities on the problems that hinder utilization of ICT-based library resources for research.

Table 8: Analysis of variance (ANOVA) of the Mean Difference in Ratings of Postgraduate Researchers of Universities (Federal, State and Private) and Faculties (Education, Social Sciences, and Engineering) on the Problems that Hinder ICT Utilization in Research

ANOVA

	Sum of Squares	df	Mean Square	F	P-value
Between Groups	12.290	2	6.145	.133	.875
Within Groups	16749.932	363	46.143		
Total	16762.221	365			

DISCUSSION OF THE FINDINGS

Problems that hinder the utilization of ICT-based library resources for postgraduate research

Findings from the study revealed a number of significant problems. It was found that overall; researchers reported significant problems associated with the use of ICT-based library resources. For instance, out of a total number of 10 items that constitutes such problems to researchers, 7 of them were considered by the researchers as significant. Only 3 of such items were considered as not significant.

These findings mean that researchers are confronted with significantly numerous problems that are associated with the use of ICT-based library resources in postgraduate research in the universities located in south-east Nigeria. These problems range among others, from lack of fund, high cost of ICT services, lack of competency by university libraries, denial of free access to the use of university websites, as well as lack of knowledge of websites. What this means is that many researchers could be hindered from benefiting from the potentials that ICT-based library resources have to offer to researchers. This could lead to poor research outputs. These findings are supported by earlier reports of Erens (1996) that lack of awareness, incompetence, as well as lack of adequate funding protracts the utilization of ICT-based resources in Nigerian libraries. Also, Agaba (2005) noted that most researchers had no access to the ICT library services. The author further reported that the researchers were not aware of the use of ICT-based library resources in research purpose. Further the finding is in agreement with the result of Manning (2000) which stipulated that another problem facing the utilization of library resources is the issue of librarians not being well acquainted with the ICT resources. This problem among others poses serious hindrances to the use of ICT-based library resources by postgraduate research students in Nigeria universities.

Strategies for enhancing the utilization of ICT-based library resources in postgraduate research

The final part of the discussion relates to the research question "what ways could be used to enhance the utilization of ICT-based library resources in postgraduate research in Nigerian universities?" In all, seven ways for the enhancement of the use of ICT-based library resources by researchers were proffered. Researchers reported that each of the ways was significant. However, they ranked the ways in terms of perceived importance and relevance as suggested by the problems as follows: Training of university librarians on ICT facility utilization, training of librarians on ICT utilization, mounting of course on ICT utilization for postgraduate degree programme, free cost of ICT utilization by post graduate research students, linking of postgraduate students to internet by university administration; and provision of laptops at subsidized cost to the postgraduate research students.

This finding is in consonant with the suggestions of Echezona (2005) who opined that the level of utilization of ICT library resources can be greatly enhanced by the provision of need base education programme by the university library to users; updating the skill of library staff to enable them to help others; improving the funding of libraries and reducing the cost of using the library services by users. Similarly, Ikegbune (1994) outlined some strategies for enhancing the utilization of ICT-based library resources to include creation of awareness on the use of ICT-based library resources, provision of better trained staff with computers in ICT utilization, and training staff in information and communication among others.

These suggestions are indications that researchers are aware of the problems of ICT-based library resources relating to their work and they need improvement in their services. These findings are in agreement with the positions of many other researchers and scholars of library and information science (see, e.g. Alabi, 2003; Etim, 2006; Gbaje, 2007). These strategies as identified solely to proffer solutions to the research question posed in this study.

Limitations of the Study

Based on the findings of the study the following limitations were noted, that could limit the generalization of the findings:

1. The study utilized questionnaire in data collection. This may have some limitations on the validity of the findings of the study as faking is always associated with questionnaire.
2. The use of only postgraduate's respondents may also limit the finding of the study because other groups such as librarians and university management cadre could have provided more valid information on the extent of utilization of ICT-based library resources.
3. The use of only three universities and three faculties for the study may have limited the generalization of the findings. This is because a larger population may have generated more responses from larger respondents.

Suggestions for Further Research

Based on the limitations of the present study, the following suggestions were made for further studies.

1. Further research in this area should be undertaken with more universities included in the study and hence, a larger sample size to enable greater confidence in generalization of results.
2. A longitudinal study can be undertaken extending on this same topic to observe changes in utilization over time given that, universities and the world at large has tilted more of ICT resources for information storage and retrieval, it is good to be kept on check so that you don't lag behind in the process of information acquisition and dissemination.
3. An experimental study can be undertaken comparing those who use and those who do not use ICT-based library resources on number of researches completed within a specified time-frame.

Conclusion

In this study, the major challenges reported as facing ICT-based library resources were postgraduate student's lack of fund, high cost of internet use, non competent of library staff, lack of access to ICT resources, lack of ICT skills by users and lack of awareness of ICT-based library resources. The study suggested the following in order to make use of ICT-based library resources effective in universities located in south-east Nigeria - university libraries should make the cost of ICT-based library resources affordable, update the skills of librarians on ICT-based resources, educate the postgraduate research students on the use of ICT-based library resources and make university websites freely available to the postgraduate research students.

Recommendations

From the discussion of the findings, the following recommendations were made:

a) University budgetary allocation to libraries should improve so that university libraries can make the cost of ICT-based library resources more affordable to users by way of subsidy.
b) The problem of inadequate awareness can be addressed by the library management in Nigerian Universities. Libraries should give more education to users on the use of ICT resources. Current awareness services, selection dissemination of information on ICT resources should be intensified by university library staff to users of the libraries.
c) The skills of librarians on ICT-based resources should be updated to enable them to direct the users on the use of ICT resources for research purposes. The skill can be connected through seminars, workshops, conferences and short course training of the staff.
d) There should be education of postgraduate research students on the use of ICT-based library resources. This will help to sensitize the postgraduate researchers on importance of ICT resources available in libraries.

e) University management should make university websites freely available to the postgraduate research students and as well connect them to research sites where they could collaborate with other researchers.

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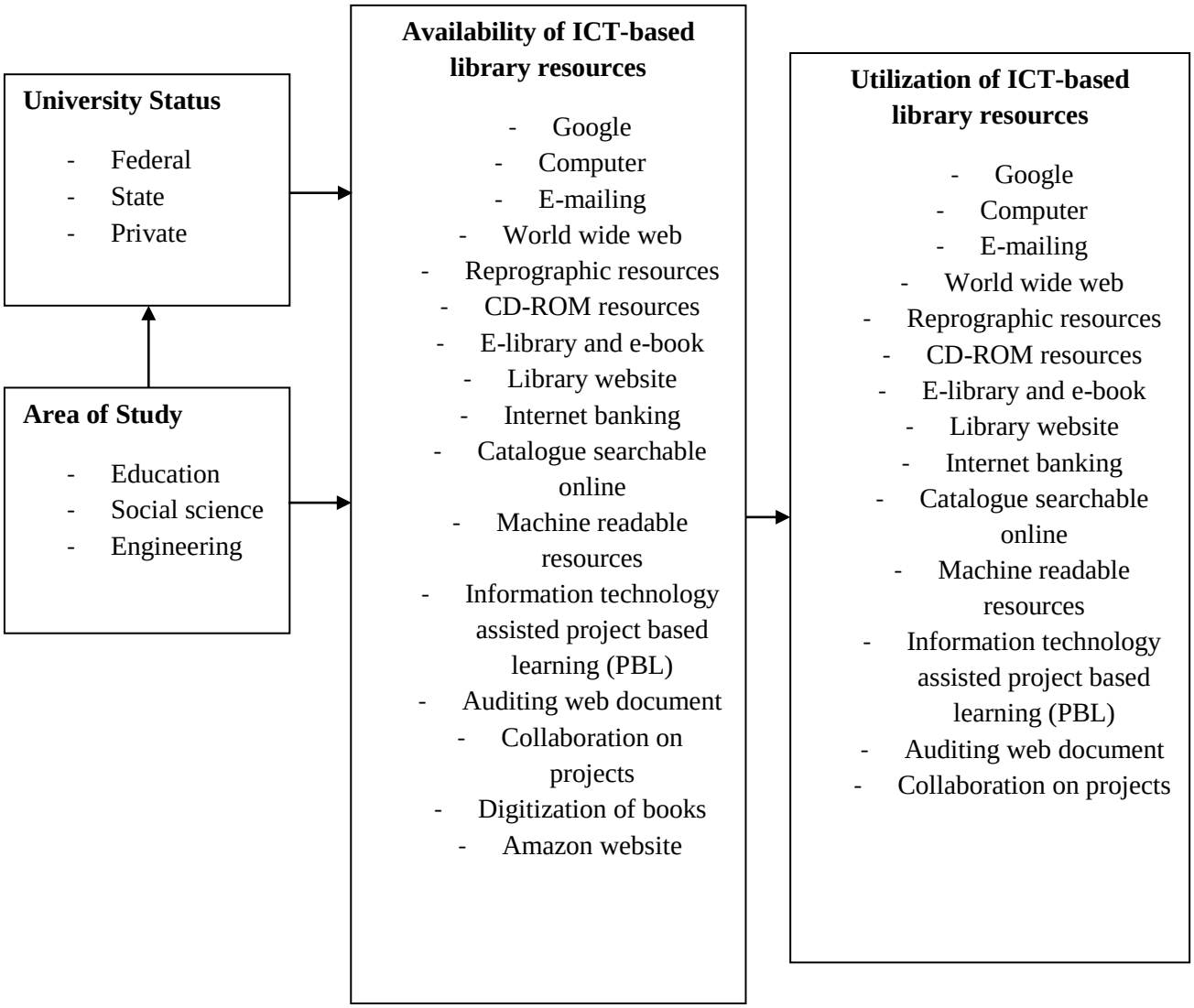
APPENDIX A

SCHEMATIC DIAGRAM OF THE RELATIONSHIP BETWEEN VARIABLES OF THE STUDY



APPENDIX B

Table 1: Federal, state, and private universities in the south-east zone of Nigeria

S/N	Name of Universities	Status	State Located
1	University of Nigeria, Nsukka	Federal	Enugu
2	Federal University of Technology, Owerri	Federal	Imo
3	Micheal Okpara University of Agriculture, Umudike	Federal	Abia
4	Nnamdi Azikiwe University, Awka	Federal	Anambra
5	Federal University, Ndufu-Alike	Federal	Ebonyi
6	Ebonyi State University, Abakiliki	State	Ebonyi
7	Anambra State University of Science and Technology, Uli	State	Anambra
8	Abia State University, Uturu	State	Abia
9	Imo State University, Owerri	State	Imo
10	Enugu State University of Science and Technology, Agbani	State	Enugu
11	Madonna University, Okija	Private	Anambra
12	Renaissance University, Ugbawka-Agbani	Private	Enugu
13	Godfrey Okoye University, Ugwuomu-Nike	Private	Enugu
14	Caritas University, Amorji-Nike	Private	Enugu
15	Paul University, Awka	Private	Anambra
16	Gregory University, Uturu	Private	Abia
17	Evangel University, Akaeze	Private	Ebonyi

Table 2: Selected universities, their status and location in the south-east zone of Nigeria

S/N	Name of Universities	Status	State Located
1	University of Nigeria, Nsukka	Federal	Enugu
2	Ebonyi State University, Abakiliki	State	Ebonyi
3	Madonna University, Okija	Private	Anambra

APPENDIX C

PROBLEMS AND WAYS TO ENHANCE THE UTILIZATION OF ICT-BASED QUESTIONNAIRE
QUESTIONNAIRE FOR POSTGRADUATE RESEARCH STUDENTS

Section A:

Please tick (√) as appropriate to you.

University Status: Federal ☐ State ☐ Private ☐

Faculty base of students: Education ☐ Social Science ☐ Engineering ☐

Section B:

Please tick (√) where appropriate in the column provided on the

Part 1: Extent of utilization of the ICT library resources in postgraduate research. (VHU = Very Highly Utilized, HU = Highly Utilized, MU = Moderately Utilized, NU = Not Utilized)

S/N	ICT Base Library Resources Facilities	Level of Availability			
		VHA	HA	MA	NA
1.	Computer				
2.	Laptops				
3.	Online catalogue				
4.	Library Website				
5.	E-Learning /Discussion group				
6.	Web document				
7.	E-Library and e-Book book				
8.	Internet				
9.	Usenet news group				
10.	Tele-communication facilities resources				
11.	Networks				
12.	Resources sharing and collaboration on project				
13.	Telephone				
14.	Television				
15.	Radio				
16.	slides				
17.	projector				
18.	Fascine (online printing)				
19.	Machine readable resources e.g. CD-Rom				
20.	Reprographic resources (e.g photocopying machine)				
21.	Bar Code Reader				
22.	Close circuit T.V (Network)				

Part 2: Problems that hinder utilization of ICT base library resources facilities. (SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree).

S/N	Problem item	Response			
		SA	A	D	SD
1.	postgraduate researchers lack awareness of ICT based library resources facilities				
2	Postgraduate researchers does not possess computer for use				
3.	They lack competence in ICT based resources usage				
4.	The students lack adequate fund to use in ICT based information retrieval				
5.	the students lack access to ICT- based resources in University libraries				
6.	The cost of internet search for research is high				
7.	The University Library Staff Do Not Possess The ICT competency to guide the students				
8.	ICT based library search is time wasting				
9.	Information from ICT based resources is not reliable				
10.	Postgraduate research students lack knowledge or website for locating appropriate group of persons materials in the net				

Part 3: Strategies for enhancing utilization of ICT based library resources in postgraduate research. (SA = strongly agree, A = Agree, D = Disagree SD = strongly disagree)

S/N	Problem item	Response			
		SA	A	D	SD
1.	A course on ICT utilization for research studies be mounted for postgraduates degree programme				
2.	The cost of using ICT facilities for postgraduate research in University libraries be made free				
3.	Training of University libraries on ICT facility utilization should be embarked on				
4.	Postgraduate students should be linked directly to the internet by the University administration.				
5.	The cost of using internet for PG research should be subsidized by the institutions concerned				
6.	library staff should be skilled in ICT based facilities				
7.	Laptop computers should be provided to postgraduates students				