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Airen Edale Adetimirin

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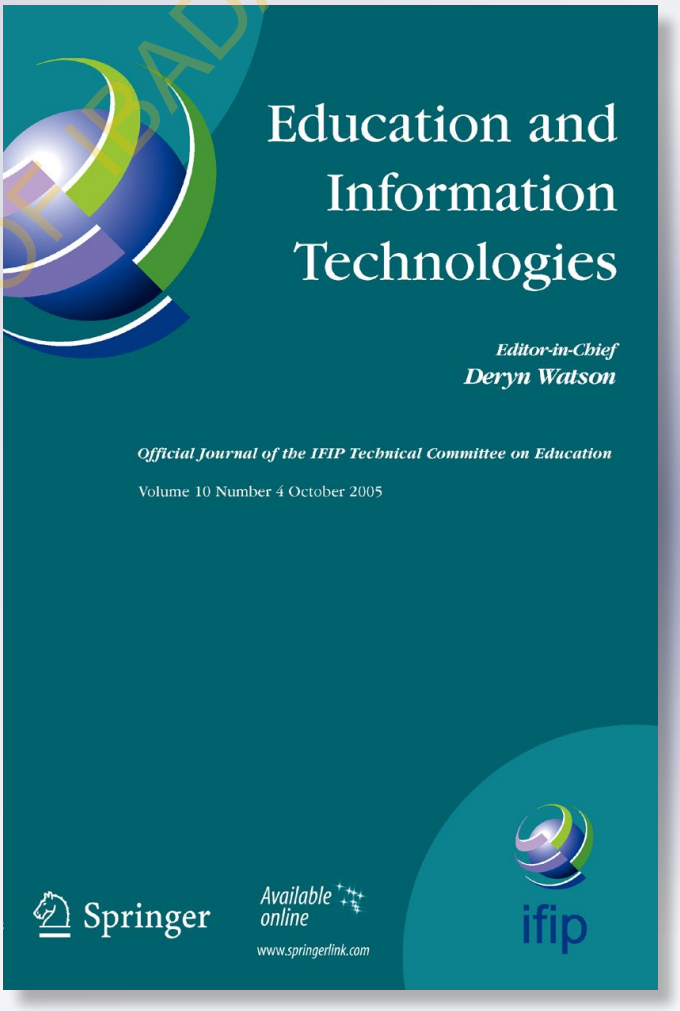

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Abstract The purpose of this study was to investigate the availability, use of Information and Communication Technology and the ICT literacy skills of undergraduates in seven Nigerian universities. The descriptive survey research design was adopted and seven universities were selected based on distribution of ownership of university. Four faculties were purposively selected with a study population of 8,497. Random sampling procedure was employed using a sampling percentage of 20% to give a sample size of 1,702. Results revealed that computer, telephone and the Internet were the three ICT mostly used by the undergraduates, although more on an occasional basis. The undergraduates in the state universities (BSU and IMSU) were found to have poor ICT literacy skills in the use of the three ICT with over 25%, while those with average ICT literacy skills were in the federal universities (ABU and UNIMAID). Three major factors affecting the ICT literacy of the undergraduates were identified as irregular power supply, inadequate ICT and limited duration of the use of the ICT. For increased ICT literacy of undergraduates, the university administrators must introduce courses on ICT competency to all students especially first year students and encourage all lecturers to use ICT for teaching and learning. The article contains original work carried out on the ICT literacy competencies of undergraduates in selected Nigerian universities and the result would be useful to library staff and university administrators.

Keywords ICT literacy · ICT use · Undergraduates · University libraries · Nigerian universities

1 Introduction

Students search for information for various reasons, among which are to complement what has been taught in their various courses and lecture notes, complete their

A. E. Adetimirin (✉)
University of Ibadan, Ibadan, Nigeria
e-mail: aeadetimirin@yahoo.com

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assignments and term papers, undertake project and write up such reports, read and pass examinations, etc. Chenoweth and Price (1997) stated that "the purpose of general education is to provide a common experience in order to ensure that students acquire skills, knowledge, and the ability to think critically and to perceive interdisciplinary relationships". Oliver (2002) also reported that one of the goals of educational institutions is to ensure that graduates are information literate and can identify, locate and evaluate relevant information to satisfy their information needs. This implies that graduates demonstrate not only skills and knowledge in their subject domains but also general attributes and generic skills.

The adoption of ICT in universities was necessitated by the continual review of the curriculum which invariably requires access to a variety of information sources and types by students and teachers (Oliver 2002). A study by Ogwu et al. (2010) on fresh undergraduates in University of Botswana to determine their computer proficiency level in order to restructure the computer curriculum under General Education Courses (GEC) for effective learning was carried out and it was found out that their computer proficiency was low. East Tennessee State University (ETSU), USA, for instance revised its curriculum by introducing a program for first year students to acquire ICT literacy which included computer literacy course, word processing, electronic communication (e-mail and Internet), and online searches (Oliver 2002) and this was to ensure that when they graduate they would be able to meet several proficiencies related to writing, speaking, and using information technology.

Academic libraries acquire and organize both printed and electronic information sources for accessibility by their clientele. Most university libraries in Nigeria are under-funded and therefore unable to acquire sufficient information materials for their students and other library users. To alleviate this problem, students and staff of universities are adopting information and communication technologies (ICT) to access current information from CD-ROMs, electronic journals and other online sources.

ICT has the capability to enhance teaching and learning through improved interaction across cultures, between students, academics and between both, but some factors in developing countries could impact otherwise (Mlitwa 2004). ICT use by undergraduates therefore becomes inevitable for academic excellence in their various disciplines. They use ICT to complement print resources available in their various libraries to retrieve relevant information for their achievement of academic goals. Students' use of technology in education is expected to improve educational outcomes, increase skills in the use of technology and decrease inequalities between groups (Corbett and Willms 2002) as employers expect graduates who will be prospective employees to possess some ICT skills. Therefore, to remain relevant in the current information age, university lecturers and students have to adopt ICT to enhance their teaching, learning and research activities. The use of such technologies by the students is however, dependent on accessibility, skills and ease of use to such technologies.

The acquisition of ICT by an organization is to meet the goals and objectives of such an organization and invariably improve its productivity and image. The availability of ICT in an organization does not imply that the users in such an organization will make use of these ICTs optimally. Bondaryk (1998) reported that

the adoption of any learning tool in higher education is dependent on awareness, willingness to use it and ability to use it. Students' experiences of the use of ICT are influenced by the type and quality of education received prior to entering the university, the level of exposure to such technologies in their family and the amount of time spent out of the educational system and labour market where day-to-day exposure to these technologies was not common (Barraket and Scott 2001). This is in agreement with the study carried out by Mutula (2010) who reported that fresh undergraduates in University of Botswana were found to lack ICT skills. McMahon et al. (1999) also reported that factors such as access, training and time (duration of use) influence the way undergraduates in UK universities use computers, as the students focused on their individual information needs.

The implications ICT have for the curriculum of universities are that students need to learn new skills such as how and when to use computers, and how to use information stored on computers to solve problems. Some Nigerian universities have responded positively by acquiring the computer technology and encouraging the use of information technology for communication following the realization that information is a powerful tool for education.

The use of ICT requires some skills to be able to retrieve the required information without much stress. The level of ICT skills a student possesses may affect use of ICT and some studies have been carried out to investigate the influence skill has on ICT use. Mutula (2010) reported that fresh students from secondary schools who got admission into the University of Botswana were largely information illiterate and this created challenges to the university in terms of offering effective academic programmes. In a study on gender differences in computer literacy among undergraduates at the University of Botswana by Tella and Mutula (2008), the findings revealed that undergraduates with higher computer literacy were more inclined to access and make use of library facilities. Ajuwon (2003) also carried out a study on the use of computer and the Internet among first year clinical and nursing students in University College Hospital, Ibadan, Nigeria and discovered that the students used these facilities to search for relevant information for their studies but some factors such as insufficient computer and Internet use proficiency as factors affected their use.

ICT literacy can be defined as the use of digital technology, communication tools and or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society (Report of the International ICT Literacy Panel 2002). Access is knowing about and how to collect and or retrieve information while management is the application of an existing organizational or classification scheme. Integration relates to interpreting and representing information and it involves summarizing, comparing and contrasting. Evaluation is the ability to make judgments about the quality, relevance, usefulness or efficiency of information, while creation is the generation of information by adapting, applying, designing, inventing or authoring information.

ICT literacy focuses on bridging the ideas of information literacy and technology literacy. It focuses on how students locate, organize and communicate information with digital environments (Katz 2005). Ibegwam (2004) carried out a study on use of the Internet by students of the College of Medicine, University of Lagos, Nigeria and found out all the 200 respondents used the Internet and majority used it for searching

academic materials and visiting other university websites. More than half of the respondents had less than six months duration of access while only a minority had used the Internet for over two years. Use of the Internet by these medical students was however faced with some problems: few computers with Internet access, unstable connectivity to the Internet and insufficient training in the use of the Internet facilities.

Oblinger and Oblinger (2005) reported that college students who grew up with the Internet might be impressively technologically literate, more accepting of new technology than their parents and instructors. The level of ICT skills a student possess may affect use of ICT and some studies have been carried out to investigate the relationship skill has on ICT use. High use of ICT by students may be affected by lack of adequate experience (Cretchley 2007). Manda and Mukangara (2007) corroborated the relevance of necessary ICT skills to improve ICT use in a study carried out on use of electronic resources in academic and research institutions in Tanzania and found that poor skills affected use of e-resources.

Luambano and Nawe (2004) in their study on Internet use by university students in Dar es Salaam, Tanzania reported that it was used mainly for communication with friends and relatives more than for academic purposes because of lack of skills required for effective use of the internet. The study recommended the provision of training on use of the Internet. Virtanen and Nieminen (2002) carried out a study on ICT use among undergraduate dental students in Finland and reported that more that 95% had good or satisfactory skills in word processing and a little over half could manage some advanced operating system functions and this influenced their use of ICT which was found to be high. It therefore becomes imperative to carry out a study to investigate factors that can affect the use of ICTs by the users (students and staff) in universities even when these ICTs are available.

1.1 Objectives of the study

The objectives are to:

1. Investigate the types of ICT available and used by undergraduates in the universities.
2. Determine the ICT literacy skills of the undergraduates in the selected universities.
3. Examine the factors affecting ICT literacy of the undergraduates in the selected universities.

2 Research methodology

The descriptive survey research design was adopted for the study and seven universities were selected based on distribution of ownership of university: three federal, two states and two privately owned. The selected universities were: Ahmadu Bello University, Zaria (ABU); University of Ibadan (UI) and University of Maiduguri (UNIMAID) all federal universities, while the state universities were:

Benue State University, Makurdi (BSU) and Imo State University, Owerri (IMSU). The two private universities were Babcock University, Ilisan Remo, (BU) and Igbinedion University, Okada (IUO).

Within these universities, four faculties were purposively selected on the basis of being available in all the selected universities and most universities in Nigeria. The faculties were Arts, Education, Science and Social Sciences. Different departments were randomly selected within each of the selected faculties to provide a broad spectrum of courses for the study (Table 1). The study population of the undergraduates was 8,497 as at 2009. Random sampling procedure was employed to choose undergraduates from all the levels in the selected departments using a sampling percentage of 20% to give a sample size of 1,702 (Table 2).

The data collection instruments were the questionnaire, interview and observation. The systems librarians were each interviewed to collect data on the available ICT facilities in their university libraries, while the questionnaire collected data on demography, types of ICT and ICT skills of the undergraduates and observations were done during the opening hours in the selected university libraries to ascertain the different types of ICT available in the libraries. Data collected were analyzed using the Statistical Package for Social Science version 10 (SPSS) for the analysis to get frequency and percentages.

3 Results

Questionnaire were distributed to 1,702 respondents, 1,476 copies were returned but only 1,284 copies were found useful for analysis giving a response rate of 87.0% (Table 3). There were more male respondents constituting 60.9% than female

Table 1 Faculties and departments selected for the study

Univ.	Faculties			
	Arts	Education	Science	Social Sc.
	Departments			
ABU	Arabic studies	Physical & Health Education	Microbiology	Political Science
BU	History & International Studies	Information Resources Management	Biochemistry	Public Admin.
BSU	French	Pre-primary Education	Chemistry	Sociology
IUO	International Relations	Not available	Mathematics	Economics
IMSU	Philosophy	Guidance & Counseling	Computer Science	Sociology & Anthro.
UI	English	Library Archival & Information Studies	Geology	Psychology
UNIMAID	History	Adult Education	Physics	Geography

Table 2 Study population and sample size of the selected faculties according to levels of study

Faculties	Level	Universities													
		ABU		BU		BSU		IUO		IMSU		UI		UNIMAID	
		SP	SS	SP	SS	SP	SS	SP	SS	SP	SS	SP	SS	SP	SS
Arts	100	24	5	24	5	89	18	38	8	149	30	44	9	94	19
	200	98	20	32	7	56	11	36	7	130	26	39	8	96	19
	300	65	13	22	4	86	17	32	6	128	26	42	9	164	33
	400	45	9	24	5	55	11	32	6	110	22	31	6	171	34
Education	100	24	5	27	6	193	39	–	–	98	20	56	11	49	10
	200	32	6	26	5	55	11	–	–	94	19	46	9	191	38
	300	29	6	4	1	89	18	–	–	86	17	45	9	174	35
	400	48	10	14	3	28	6	–	–	83	17	27	5	187	37
Science	100	86	17	47	10	150	30	34	7	64	13	44	9	111	22
	200	89	18	25	5	68	14	30	6	66	13	37	7	85	17
	300	75	15	22	4	54	11	34	7	IT	IT	49	10	30	6
	400	97	19	35	7	0	0	32	6	57	11	25	5	24	5
Soc. Sc.	100	290	58	36	7	250	50	50	10	127	25	93	19	218	44
	200	221	44	44	9	152	30	48	10	116	23	67	13	160	32
	300	212	42	34	7	197	39	45	9	110	22	60	12	231	46
	400	75	15	39	8	151	30	40	8	105	21	65	13	130	26
Total		1,510	302	455	93	1,673	335	451	90	1,523	305	770	154	2,115	423

KEY: SP—Study population = 2,547, SS—Sample size = 1,702

IT (Industrial Training): 300 level students on Industrial Attachment in Faculty of Science in IMSU

respondents and 727 respondents (56.6%) were found to be between 20 and 24 years old, indicative that they were young adults.

3.1 ICT use by undergraduates

The result from the observation revealed that in all the universities studied, ICT were available on their campuses in different locations such as university libraries, computer laboratories and cyber cafes, although, the libraries of BSU and IMSU did not have any ICT for the use of the respondents. Three ICT available and used by the undergraduates were considered for this study: computer, telephone and the Internet. The percentage of undergraduates that used these ICT ranged from 66.1% to 98.8% across the selected universities (Table 4). The undergraduates used ICT for academic tasks such as for class work, assignment, term paper, seminar and project report. It was observed that the ICT available for use by respondents in the university libraries of ABU, BU, IUO, UI and UNIMAID were computers, the Internet and CDROM, while the computer laboratories and cyber cafes in the various universities had computers and the Internet. The number of the available ICT was found to be inadequate when compared with the number of undergraduates in these universities.

Table 3 Questionnaire distribution and response rate

University	Copies of questionnaire			Response rate (%)
	Distributed	Returned	Useful for analysis	
Ahmadu Bello Univ.	302	289	274	94.8
Babcock Univ.	93	93	93	100.0
Benue State Univ.	335	319	249	78.1
Igbinedion Univ.	90	87	82	94.2
Imo State Univ.	305	260	213	81.9
University of Ibadan	154	137	123	89.8
University of Maiduguri	423	291	250	85.9
Total	1,702	1,476	1,284	87.0

Among the ICT commonly used by the undergraduates, telephone had the highest frequency of use, although the percentage of its use was much lower in IUO than in the other universities (Table 4). The three mostly used ICT (computer, the Internet and telephone) were found not to be used by all the respondents in all the selected universities. Using the level of study of the respondents, the frequency of use of ICT was highest for telephone, computer and the Internet and 300 level respondents were the highest users of the computer and the Internet. Respondents that used the Internet on a daily basis were found to be least in all the universities.

The proportion of the total number of respondents that used telephone on a daily basis was between 54.0% and 90.2%. In ABU, a high percentage of the respondents used the computer and the Internet occasionally (41.7% and 41.4% respectively). Occasional users were those that used ICT once in a while, that is, less than once in a month. In BU, 39.8% of the respondents used the computer daily, and a considerable proportion (33.7%) used it occasionally. The highest proportion of the Internet users were for occasional use (30.0%), although 23.8% and 22.5% used this facility twice a week and once a week, respectively (Table 4).

Majority of the users of the computer and the Internet in BSU used it occasionally, constituting 54.7% and 49.6% respectively. Respondents that used these ICT on a daily, twice-a-week and once-a-week were each less than 20%. These results indicated the frequency of use of these ICT to be low. Majority of the undergraduates in IUO used the computer and the Internet once a week which accounted for 64.6% and 65.4% respectively (Table 4)?

In IMSU, the highest frequency of use for the computer among the undergraduates were twice a week (26.4%) with another 24.5% using it on a daily basis. The highest frequency of use for the Internet was for once-a-week (34.8%), followed by those who used it occasionally (29.6%) and least by respondents who used it twice-a-week (21.5%). Majority of the users in UI and UNIMAID used the computer and the Internet occasionally (41.2% and 45.7%; 28.0% and 39.3% respectively). For these ICT, percentage of respondents who used them daily, twice-a-week', weekly was lower than 21%. These results indicated low use of the computer and Internet for academic tasks by undergraduates in both UI and UNIMAID (Table 4).

Table 4 Types of ICT used by undergraduates in the selected universities

Universities	ICT	N	Frequency of ICT usage						
			Occasionally (%)	Once/ Month (%)	Twice/ month (%)	Once/ week (%)	Twice/ week (%)	Daily (%)	Mean score±sd
ABU	Computer	192	41.7	9.9	4.7	18.8	10.9	14.1	2.9±1.91
	Internet	181	41.4	12.7	8.8	16.6	8.8	11.6	2.7±1.82
	Telephone	235	20.0	1.7	1.7	9.4	7.7	59.6	4.6±2.00
BU	Computer	83	33.7	3.6	1.2	13.3	8.4	39.8	3.8±2.21
	Internet	80	30.0	8.8	5.0	22.5	23.8	10.0	3.3±1.82
	Telephone	80	22.5	1.3	1.3	2.5	5.0	67.5	4.7±2.10
BSU	Computer	234	54.7	8.1	6.8	6.8	12.8	10.7	2.5±1.88
	Internet	234	49.6	9.0	2.6	16.2	15.0	7.7	2.6±1.84
	Telephone	200	30.0	1.0	1.0	6.5	7.5	54.0	4.2±2.23
IUO	Computer	79	15.2	0.0	1.3	64.6	2.5	16.5	3.9±1.44
	Internet	81	12.3	0.0	1.2	65.4	18.5	2.5	3.9±1.18
	Telephone	80	11.3	0.0	1.3	62.5	0.0	25.0	4.2±1.42
IMSU	Computer	163	22.1	13.5	0.0	13.5	26.4	24.5	3.8±1.94
	Internet	135	29.6	9.6	0.0	34.8	21.5	4.4	3.2±1.69
	Telephone	174	8.6	0.6	0.0	0.0	0.6	90.2	5.5±1.43
UI	Computer	102	41.2	2.9	10.8	14.7	11.8	18.6	3.1±2.00
	Internet	93	28.0	11.8	7.5	20.4	20.4	11.8	3.3±1.81
	Telephone	96	14.6	0.0	10.4	2.1	2.1	70.8	4.9±1.87
UNIMAID	Computer	219	45.7	19.6	1.4	12.8	11.8	18.6	2.6±1.85
	Internet	229	39.3	7.4	6.1	19.2	17.0	10.9	3.0±1.88
	Telephone	225	17.3	7.1	0.0	5.8	5.3	64.4	4.7±2.01

3.2 ICT literacy of undergraduates

An analysis of cross tabulation of ICT skills possessed by the undergraduates in the selected universities was carried out. For the knowledge of ICT facilities, poor and very poor were grouped together and the average found. This process was repeated for very good and good so that the interpretation of the results would be meaningful and concise.

The undergraduates were found to acquire their ICT skills mainly through friends and personal development by going for private paid computer literacy programs run by private computer companies. The universities did not provide computer literacy programs for the undergraduates. The result showed that respondents in the state universities (BSU and IMSU) had poor skills (above 27% when the average for very poor and poor was found) for all the three ICT facilities (computer, Internet and telephone), while those in federal universities had good knowledge of the computer, the Internet and telephone (Table 5). More than 20% of the respondents in ABU, BSU and UNIMAID had been using the computer, the Internet and telephone for

Table 5 Level of ICT skills and duration of ICT use by respondents in the universities

ICT facilities		Universities							
		N (%)	ABU (%)	BU (%)	BSU (%)	IUO (%)	IMSU (%)	UI (%)	UNIMAID (%)
Knowledge of ICT									
Computer	V. Poor	45	0.0	2.2	55.6	0.0	35.6	6.7	0.0
	Poor	88	4.5	0.0	48.9	0.0	22.7	5.7	18.2
	Average	438	26.9	8.4	16.7	3.9	5.9	14.6	23.5
	Good	329	14.0	4.6	22.4	3.3	25.5	9.4	20.7
	V. Good	237	13.1	13.1	8.0	21.9	19.4	4.6	19.8
Internet	V. Poor	42	0.0	0.0	66.7	0.0	21.4	7.1	4.8
	Poor	90	1.1	2.2	53.3	0.0	30.0	5.6	7.8
	Average	401	26.4	5.2	18.2	3.5	5.2	15.2	26.2
	Good	293	12.6	9.6	23.2	3.4	19.8	9.6	21.8
	V. Good	273	16.8	11.7	4.4	19.4	19.0	6.2	21.2
Telephone	V. Poor	33	0.0	0.0	33.3	0.0	51.5	6.1	9.1
	Poor	39	0.0	0.0	64.1	0.0	30.8	5.1	0.0
	Average	149	40.3	8.1	14.8	6.0	2.7	4.7	23.5
	Good	259	24.7	5.8	23.6	0.8	18.1	8.5	18.5
	V. Good	592	16.9	9.8	13.2	10.0	14.5	12.3	23.3
Duration of use									
Computer	<6 months	166	9.6	1.2	26.5	0.6	37.3	7.8	16.9
	6–12 months	107	12.1	7.5	41.1	2.8	8.4	6.5	21.5
	1–2 years	256	18.0	3.1	22.3	3.1	6.6	10.2	36.7
	2–5 years	334	24.6	7.8	17.7	11.7	12.9	10.5	15.0
	>5 years	232	15.5	15.9	12.5	12.5	17.2	12.5	13.8
Internet	<6 months	149	7.4	2.0	37.6	0.7	30.2	7.4	14.8
	6–12 months	130	20.0	6.2	41.5	1.5	6.9	6.9	16.9
	1–2 years	257	19.5	4.7	21.0	3.9	5.1	8.9	37.0
	2–5 years	326	19.9	9.2	15.3	12.3	6.1	13.5	23.6
	>5 years	198	12.1	14.6	6.1	14.1	31.8	11.1	10.1
Telephone	<6 months	115	11.3	1.7	18.3	0.9	37.4	9.6	20.9
	6–12 months	53	3.8	9.4	43.4	3.8	7.5	5.7	26.4
	1–2 years	158	25.3	5.1	30.4	1.9	1.3	12.7	23.4
	2–5 years	276	25.7	5.8	13.0	15.9	11.6	10.5	17.4
	>5 years	462	22.7	10.0	13.6	6.5	14.9	9.3	22.9

more than a year (Table 5). Undergraduates in the state universities (BSU and IMSU) had poor skills for all the three ICT facilities skills and this could be attributed to the inadequate ICT facilities available in these universities (Table 5). Respondents in ABU and UNIMAID which were federal universities had good ICT skills because

they had been using ICT for more than one year and universities had more ICT available for use for the undergraduates in their libraries and cybercafés on campus and outside the campus.

Respondents in Faculty of Social Sciences were found to have poor skills in the use of computer and the Internet (with more than 33%), when the average was computed for very poor and poor ICT knowledge, while over 34% of the respondents in Faculty of Arts were found to have poor skills in the use of the telephone (Table 6). This may be because information in materials in the Social Sciences and Arts do not get outdated as quickly as those in the Sciences; therefore, respondents do not need to frequently use ICT. Using the duration of ICT, respondents in Faculty of Social Sciences were found to have the highest percentage in the duration of using the three ICT facilities, having been using it for more than one year (Table 6).

Respondents in first year were found to possess poor skills (more than 30%) in the use of ICT, while those in the third year were found to possess good skills (more than 24%) in ICT use (Table 7). Results showed that respondents in third year were found to be been using the ICT facilities for more than five years which was the highest than respondents in other levels (Table 7). This may be due to the fact that fourth year students are expected to write a project report as a criteria for the award of their degree and this would necessitate frequent use of ICT to access the relevant information. The low ICT skills possessed by the first year respondents could be attributed to their none or low use of ICT before their admission to the university.

3.3 Constraints to ICT Literacy

Six factors identified as constraints to ICT literacy of the undergraduates were: namely: Inaccessibility to ICT, Inadequate ICT, lack of skills to use these facilities, irregular power supply, limited duration for the use of ICT and frequent computer breakdown (Table 8). Out of these six factors, three were found to be major given that more than 50% of the respondents identified them as constraints: irregular power supply (67.4%), inadequate ICT (54.3%) and limited duration of the use of the available ICT (54.2%).

Among the constraints identified, irregular power supply was identified as a problem in all the universities studied since this is a national problem faced by all in the country, between 49.3% in IMSU and 90.2% in IUO. Power supply was the only constraint for which the pattern of response was similar for all the seven universities. The power outages occur more frequently when the respondents are likely to use the ICT; these could be during the day when there is access to ICT in the libraries. Many of the university libraries are now acquiring generating plants and solar power system as an alternative power supply to address the power problem.

The pattern of response for the other two major factors varied across universities. For inadequate ICT, undergraduates in four universities; BU (62.0%), BSU (68.7%), IMSU (58.2%) and UNIMAID (65.2%) considered it as a major constraint to ICT literacy, while 54.9% of those in IUO did not consider it to be a constraint at all (Table 8). These results indicated differences in the level of adequacy of ICT among the universities with ABU, IUO and UI being better in terms of availability of ICT. For limited duration of the use of available ICT, IUO was the only university that did

Table 6 Level of ICT skills and duration of ICT use by undergraduates in the selected faculties

ICT facilities		N	Faculties			
			Arts (%)	Educ. (%)	Sci. (%)	Social Sci. (%)
Knowledge of ICT						
Computer	V. Poor	45	28.9	37.8	13.3	20.0
	Poor	88	30.7	15.9	12.5	40.9
	Average	438	16.9	17.1	21.7	44.3
	Good	329	21.6	23.7	19.5	35.3
	V. Good	237	27.4	16.5	24.5	31.6
Internet	V. Poor	42	40.5	28.6	11.9	19.0
	Poor	90	16.7	23.3	10.0	50.0
	Average	401	19.2	17.2	19.5	44.1
	Good	293	21.5	20.5	25.9	32.1
	V. Good	270	25.9	17.4	25.6	31.1
Telephone	V. Poor	33	48.5	39.4	9.1	3.0
	Poor	39	20.5	17.9	10.3	51.3
	Average	149	23.5	20.1	24.2	32.2
	Good	259	23.6	17.4	18.1	40.9
	V. Good	592	19.9	19.6	21.5	39.0
Duration of use						
Computer	<6 months	166	19.9	38.6	10.8	30.7
	6–12 months	107	23.4	21.5	12.1	43.0
	1–2 years	256	25.8	18.8	15.6	39.8
	2–5 years	334	21.0	14.4	21.9	42.8
	>5 years	232	22.8	16.8	31.9	28.4
Internet	<6 months	149	14.8	40.3	13.4	31.5
	6–12 months	130	25.4	20.0	10.8	43.8
	1–2 years	257	22.2	19.5	19.8	38.5
	2–5 years	326	27.0	10.4	19.0	43.6
	>5 years	198	19.2	20.2	34.8	25.8
Telephone	<6 months	115	19.1	33.0	12.2	35.7
	6–12 months	53	17.0	22.6	5.7	54.7
	1–2 years	158	28.5	19.0	15.2	37.3
	2–5 years	276	20.7	14.9	22.8	41.7
	>5 years	462	21.4	19.3	23.2	36.1

not agree that this was a constraint (81.7%), while respondents in two universities considered it a constraint, between 48.0% in ABU to 49.5% in BU and respondents in the four universities considered it to be a major constraint, between 51.2% in IMSU to 73.9% in BSU.

Between the private universities (BU and IUO), IUO was found to have adequate ICT and the use of ICT was not limited to the respondents while

Table 7 Level of ICT skills and duration of ICT use by undergraduates according to level of study

ICT facilities		N	Level of study			
			100 (%)	200 (%)	300 (%)	400 (%)
Knowledge of ICT						
Computer	V. Poor	45	40.0	17.8	20.0	22.2
	Poor	88	20.5	35.2	25.0	19.3
	Average	438	33.6	24.0	22.8	19.6
	Good	329	20.7	35.9	19.1	24.3
	V. Good	237	21.1	19.8	38.8	20.3
Internet	V. Poor	42	40.5	14.3	23.8	21.4
	Poor	90	27.8	44.4	12.2	15.6
	Average	401	31.9	26.7	21.4	20.0
	Good	293	19.5	26.6	26.3	27.6
	V. Good	270	25.2	18.5	35.9	20.4
Telephone	V. Poor	33	60.6	21.2	6.1	12.1
	Poor	39	23.1	56.4	5.1	15.4
	Average	149	31.5	22.8	26.8	18.8
	Good	259	22.8	22.4	21.2	33.6
	V. Good	592	25.8	28.9	28.2	17.1
Duration of use						
Computer	<6 months	166	39.2	18.7	14.5	27.7
	6–12 months	107	29.0	29.9	19.6	21.5
	1–2 years	256	22.7	33.2	24.2	19.9
	2–5 years	334	26.3	30.5	20.7	22.5
	>5 years	232	17.7	20.7	44.4	17.2
Internet	<6 months	149	28.9	23.5	19.5	28.2
	6–12 months	130	31.5	29.2	23.1	16.2
	1–2 years	257	32.3	24.5	22.6	20.6
	2–5 years	326	22.1	28.8	27.0	22.1
	>5 years	198	17.2	19.7	41.4	21.7
Telephone	<6 months	115	34.8	15.7	19.1	30.4
	6–12 months	53	28.3	41.5	13.2	17.0
	1–2 years	158	32.3	24.7	24.1	19.0
	2–5 years	276	26.1	30.4	22.5	21.0
	>5 years	462	20.1	27.3	32.0	20.6

respondents in BU agreed that inadequate ICT and limited duration of use of available ICT were major constraints affecting their use of ICT. The state universities (BSU, IMSU) were found to be affected by all three major constraints (irregular power, Inadequate ICT and limited duration of use of available ICT) this implied that the state university administrators should urgently adopt measures to increase the ICT in these state universities. Among

Table 8 Constraints to ICT literacy by undergraduates in the selected Nigerian universities

Constraints	Options	N	Universities						
			ABU	BU	BSU	IUO	IMSU	UI	UNIMAID
Inaccessibility to ICT facilities	Agree	447	31.8	36.6	49.4	13.4	23.5	26.0	44.0
	Not sure	154	14.6	14.0	14.9	14.6	0.5	15.4	12.8
	Disagree	683	53.6	49.5	35.7	72.0	76.1	58.5	43.2
Inadequate no of ICT facilities	Agree	697	40.1	62.0	68.7	31.7	58.2	37.4	65.2
	Not sure	133	13.9	5.4	6.4	13.4	2.8	17.1	14.4
	Disagree	453	46.0	32.6	24.9	54.9	39.0	45.5	20.4
Lack of skills to use these facilities	Agree	524	31.0	21.5	59.8	13.4	32.4	40.7	56.0
	Not sure	138	13.1	25.8	8.4	14.6	5.2	13.0	7.2
	Disagree	622	55.8	52.7	31.7	72.0	62.4	46.3	36.8
Limited duration for the use of ICT	Agree	696	48.0	49.5	73.9	17.1	51.2	61.0	54.8
	Not sure	99	9.2	16.1	5.6	1.2	4.2	9.8	9.2
	Disagree	488	42.9	34.4	20.5	81.7	44.6	29.3	36.0
Irregular power supply	Agree	859	80.7	66.7	64.3	90.2	49.3	51.2	69.6
	Not sure	93	2.9	9.7	10.4	1.2	7.0	10.6	8.4
	Disagree	322	16.4	23.7	25.3	8.5	43.7	38.2	22.0
Frequent computer breakdown	Agree	449	31.0	47.3	32.9	19.5	27.7	45.5	42.8
	Not sure	334	32.5	16.1	25.3	12.2	31.0	18.7	27.2
	Disagree	501	36.5	36.6	41.8	68.3	41.3	35.8	30.0

the federal universities, respondents in UNIMAID and ABU agreed that their use of ICT were affected by inadequate ICT and limited duration of use of these ICT facilities.

4 Discussion

4.1 Use of ICT by undergraduates

The use of ICT by undergraduates was considerably low and this was supported by the study on computer proficiency among fresh undergraduates of University of Botswana by Ogwu et al. (2010) who reported that their use of ICT was low. This result can be compared to the daily users of search engines among postgraduates in University of Ibadan (Salako and Tiamiyu 2007) and daily users of the Internet among dental undergraduate students reported for the University of Oulu, Finland by Virtanen and Nieminen (2002).

Among ICT, the Internet is credited with allowing access to a wide range of knowledge, especially as it has become central to scholarly communication through the creation of numerous e-journals and teaching resources (Leong and Hawamdeh 1999; Koubek and Jandl 2000; Thelwall 2002; Rajab and Baqain 2005). Although availability of ICT may not necessarily translate to higher use, the

ICT available in the universities studied were considered inadequate when compared with the number of undergraduates to constitute a limitation to the widespread use of ICT.

4.2 ICT Literacy of undergraduates

The third year undergraduates were found to possess good ICT skills because they had been using the ICT for more than five years. This finding is supported by Tella and Mutula (2008) who reported that undergraduates at University of Botswana who had higher computer literacy accessed and used the library facilities. Mcilroy et al. (2007) also corroborated this finding in their study of computer experience and regular use by undergraduates in Liverpool Moore University, USA and reported that these attributed positively to their use of the computer, while Rajab and Baqain (2005) in a study on ICT use by dental undergraduates at the University of Jordan reported that availability and accessibility to ICT facilitated the use and subsequently improved their ICT skills.

Frequent use of ICT would improve ICT skills and the longer the duration of its use, the better the skills possessed. The result is supported by Ogwu et al. (2010) who reported that the rate of knowledge acquired in ICT increased as the undergraduates in University of Botswana progressed in their academic pursuit. Cretchley (2007) and Manda (2005) also reported the relevance of ICT skills to improve ICT use in a study carried out on use of electronic resources in academic and research institutions in Tanzania where it was found that poor skills affected use of electronic resources.

Luambano and Nawe (2004) in their study on Internet use by university students in Dar es Salaam, Tanzania reported that due to their lack of skills required for effective use of the Internet, it was used mainly for communication with friends and relatives more than for academic purposes and recommended that an increase in the use of the Internet for academic purposes can be achieved through training. Virtanen and Nieminen (2002) reported that the use of ICT by dental undergraduates in Finland was high as more that 95% had good or satisfactory skills in word processing and a little over half could manage some advanced operating system functions.

The undergraduates acquired their ICT skills from friends and self-development rather than through organized university trainings. This however agrees with the study of Haywood et al. (2004) in a study on comparison of ICT skills and students across Europe where they reported that those undergraduates acquired their ICT skills more from informal training and support such as from friends and family than from integrated training and self-tuition.

4.3 Constraints to ICT literacy

The state universities (BSU, IMSU) were found to be affected by all three major constraints (irregular power, inadequate ICT and limited duration of use of available ICT) which implied that the state university administrators should urgently adopt measures to increase the ICT in their universities. This finding is

corroborated by Jagboro (2003) in a study of Internet usage by postgraduates in Obafemi Awolowo University, Ile-Ife, Nigeria who listed limited access points available in the library and Ajuwon (2003) who reported insufficient computer and Internet use proficiency as factors affecting the use of computer and the Internet among first year clinical and nursing students in a Nigerian teaching hospital.

Among the federal universities, respondents in UNIMAID and ABU agreed that their use of ICT were affected by inadequate ICT and limited duration of use of these ICT facilities. The findings is supported with those of Igben and Akobo (2007) who listed stable power supply and good telecommunication, knowledgeable technical expertise as factors that affect the use of ICT. Barraket and Scott (2001) in their study on students' experiences of ICT use in University of Technology, Sydney, Australia, highlighted ready access to infrastructure, availability of facilities, maintaining and upgrading equipment as factors that affected the effective use of ICT.

Cisse (2004) in the study on access to electronic information reported that inability to access the equipment, difficulty encountered in using ICT affected use of electronic resources, while Ibegwam (2004) observed that students of the College of Medicine, University of Lagos, Nigeria listed frequent computer breakdown and slow speed of downloading materials as factors affecting their use of the Internet. The effect of these constraints may be reduced in the federal universities due to the intervention of some foreign organizations that have been assisting in the acquisition and implementation of ICT infrastructure in such institutions.

4.4 Conclusion and recommendations

ICT use is of great importance in education for the processing, accessing and communication of information by undergraduates in Nigerian universities. Nigerian Universities are providing ICT to complement the available print resources in the library to meet the information needs of its users. The university libraries due to their underfunding could not provide all the relevant information to meet the information needs of their undergraduates. The alternative adopted has been the introduction of ICT to provide the needed information to its users which are made up of students (undergraduates and postgraduates), staff and the community. The federal and private universities were found to possess more ICT for the use of their undergraduates than the state universities.

The ICT available in the seven universities were inadequate and this constituted a limitation to their effective use and literacy skills. The challenges faced by the undergraduates in their zeal to use the available ICT in the universities were irregular power supply, inadequate number of available ICT, lack of skills to use ICT and limited time of access to available ICT. These challenges must be addressed by the university administrators for increased ICT literacy skills of the undergraduates. The university administrators must introduce courses for ICT competency to all first year undergraduates and encourage lecturers to use ICT for teaching and learning. This will further enhance the use of ICT by the undergraduates and ultimately increase their ICT literacy.

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