INFLUENCE OF GENDER AND PSYCHOSOCIAL FACTORS ON ICT SKILLS DEVELOPMENT: POSTGRADUATE STUDENTS OF UNIVERSITY OF IBADAN AS CASE STUDY

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Abstract

The proliferation of Information and Communication Technology (ICT) into every facet of the work-sphere in every sector has led to the increasing demand for workers who are versed with ICT skills, and can provide solutions to a myriad of problems for an organisation. However, in a developing country like Nigeria, there is still a perceived deficit as regards ICT skills acquired by graduates. This study interrogated the influence of gender and psychosocial factors on ICT skills development among postgraduate students. This study adopted a survey research design. Data were elicited from a sample of 398 respondents and analysed using frequency counts, percentages, Chi-square tests of association, Spearman's rank correlation, and regression analysis. The study provided answers to three research questions and three research hypotheses were tested. The result showed that gender and psychosocial factors jointly influenced the ICT skills development of the students on postgraduate programmes in the University of Ibadan ($F_{(4,392)}=17.054, P<0.05$). Individually, gender ($\beta = -0.183$, $P<0.05$), and interaction with more knowledgeable other ($\beta = 0.260$, $P<0.05$) have a significant influence on ICT skills development, while social interaction, and zone of proximal development does not. The study showed that males are more developed in ICT skills.

Keywords: Gender, Information and communication technology, psychosocial factors and skill development

Introduction

There is a growing acceptance among academics, policy-makers in education and employer groups that the development of Information and Communication Technologies (ICT) skills is part of the role of higher education (Odede & Enakerakpo, 2013). According to B-HERT (2002), organisations prefer to employ graduates with vast ICT skills in addition to their degree statuses. In the current labour market, most employments require that job seekers have basic ICT skills (Garrido, Sullivan &

Gordon, 2012). ICT skills are not just about being able to use computers and the associated packages, but being able to use the knowledge acquired from it to create, manipulate and present information in various formats such as text, image, or number in an integrated task (Tariq & Cochrane, 2003).

According to the International Telecommunication Union (2014), there is an acknowledgement that development in ICT is transforming different sectors in the society such as the health sector, agriculture, education, government and others. This transformation requires that employees should have skills to interact with the computers, mobile phones and various internet-enabled applications that promote the transformation. ICT provides opportunities for new businesses with higher productivity, and also creates opportunities for new jobs but also demands that people should acquire ICT related skills (Vladmir, 2002). Considering that ICT has permeated into every sector of the economy, most ICT professionals do not work for ICT-specific firms but mostly for various other organisations and relevant economic sectors. This makes ICT professionals spread across various sectors of the economy such as manufacturing industries, food companies, financial institutions, government administration, research institutes and so on (Hassan, Babawuro, Muhammad & Yahya, 2013).

Keeley and Céline (2017) have reported that many young people in developing countries lag behind their counterparts in the developed countries in their experiences with ICT. Many do not have access to ICT, while those with access do not have the required ICT skills needed to succeed, resulting in a mismatch between what the labour market demands and what various formal and non-formal institutions provide their learners with (Werquin, 2010). In Nigeria, both public and private higher institutions have been making efforts to enable internet connectivity in schools (Ogunsola and Alade, 2016; Ogunsola & Adekola, 2019). These efforts are targeted at improving education and research, and enhancing the skills needed to be computer literate. The popularisation of Web 2.0, mobile applications as well other ICTs have changed the ways things are done. These changes have necessitated for an update as well as an upgrade in the types of ICT skills that are needed to perform optimally in today's world. Examples of such skills include graphic design, website design, computer programming, online marketing, blogging (creating and marketing of blogs), database design and management, spreadsheets application, power points design, word processing and so on.

Despite the prospects of ICT to economic development and the reduction of unemployment in a developing country like Nigeria, there are few studies done with regards to the factors affecting ICT skills development. It is a major concern that youths are not exploiting the advantage of ICTs for self-sustainability and to boost their employability status. This study focuses on how gender and psychosocial factors contribute to ICT skills development among students in postgraduate degree

programmes in the University of Ibadan, Nigeria.

Psychosocial factors refer to ways in which knowledge and skills are acquired such as social interaction, having access to more knowledgeable others and being in a zone of proximal development. Social interactions refer to a particular type of external factors in which the actions and behaviour of a person are affected by a reference group. More knowledgeable other refers to someone with a higher understanding, knowledge, and capacity to function than a learner concerning a particular task. Zone of proximal development refers to the distance between a learner's ability to perform a task while under supervision and the student's ability to perform the task independently.

ICT skills development is measured by computer literacy skills; digital literacy skills and ICT complementary skills. Computer literacy refers to a learner's competence to use computers as well as other related technologies. Digital literacy is the degree of competence a user has to evaluate, navigate, use and create information with the aid of digital technologies while ICT complementary skills are those ICT-related skills needed by learners before they can participate actively and meaningful in the society. This study is in two parts with part II presenting the result of the influence of individual characteristics, and social learning modelling factors on ICT skills development among the study population (Ogunsola & Adesakin, 2020).

According to reports by the International Telecommunication Union (2014) and World Bank Live (2016), ICT provides promising avenues to tackle the problem of unemployment in various economies of the world, especially in the developing countries. Bassey and Ushie's (2013) study examined the role of ICT in developing skilled workers with the aid of vocational technical education at schools of higher learning in Cross River State, Nigeria, and found that ICT played a major role in developing skilled workers. Also, Elsaadani (2015) studied the ICT skills' sufficiency of Egyptian accounting graduates. The result showed that graduates should have skills about using the Internet, e-mail, and software packages such as accounting and spreadsheet software, database management software, and word processing software. None of these studies examined the factors influencing ICTs skills development. This study filled the research gap.

Eze (2013) conducted a study on how ICT can help re-brand youths for empowerment and reorientation in Nigeria. The study highlights the avenues through which ICT has yielded a positive change in the re-orientation of Nigerian youths. All these studies have highlighted the immense contribution of ICT skills in this modern age as a means of securing jobs and personal development. Despite the seeming advantage, there is still a gap when it comes to ICT skill development among students especially in a developing country like Nigeria. It is in light of this that this study seeks to identify how gender and psychosocial factors affect ICT skills development of postgraduate students.

Information and Communication Technology plays an important role in transforming the ways by which services are rendered, as well as providing avenues for generating new activities and employment in various service firms (Petit 1995; Andersen, Howells, Hull, Miles and Robert, 2000). ICT contributed to human development, especially when there is access (Haddon, 2001; Walsh, Gazala & Ham, 2001).

There are some empirical studies on ICT skills development, for example, Mwewa, Samuel and Musonda (2014) conducted a research on factors affecting ICT skills development by university students who studied mathematics in Mukuba University, Zambia. The findings showed that year of study, age of the respondents, ICTs usage by the lecturers, and nature of bachelor' degree programme affects the development of ICT skills. The study also revealed that sex of the respondents, residential province and the level of confidence in ICT use has positive effects of ICT skills development. Mohamed, Judi, Nor and Yusof (2012) in their study examined if ICT usage and skills were instrumental in reducing the digital divide between rural and urban communities with special focus on Kundang Ulu area. The results showed that few people own computers, the level of usage of ICT was low, and only weak to moderate levels of basic ICT skills exist among students who participated in the study. The findings established that digital gap is a persistent issue in the area. Nisar, Munirand Shad (2011) examined the use and effects of ICT in the education sector of Pakistan. The study posited that ICT helped the students to improve on their skills and also improve their learning skills. Data was collected from 429 respondents using convenience sampling method from five colleges and universities at Rawalpindi, Pakistan. The result showed that availability and ICT usage improved the knowledge and learning skills of students. This shows that ICT helps in promoting efficiency in education as well as providing avenues by which policies regarding the education sector can be made.

Asgarkhani and Wan (2008) conducted a study of current trends in ICT education within the tertiary sector. The study aimed to elaborate on the effectiveness of information systems and IT education for developing work-ready graduates. It compared ICT skills acquired by students throughout their course of studies with skills identified as important skills by the ICT industries. A sample of 205 graduating ICT students participated in focus groups for the study. The study showed that the majority of the students had the skills needed to thrive in the ICT industry.

Eyitayo (2012) examined the design and development of ICT skills information resource prototype using Task Person Technology Fit (TPTF) Model. The study aimed at analysing ICT skills needs of final year undergraduate students, to help them find the information required for their final year research projects. The results showed that respondents do not have the advanced ICT skills that were needed for their research projects. The study provided a conceptual framework that can be used to study the skills needs and the appropriate ICT resources that will meet the needs of the target group.

Israel and Ediseri (2014) examined the ICT skills and internet usage of undergraduates of Library and Information Science (LIS) departments, Delta and Edo States Universities. Findings showed that there was no significant relationship between the ICT skills possessed by the respondents and their internet usage. However, the respondents have ICT skills and they use the internet adequately. Findings also showed that the most common way of getting ICT skills by the undergraduates was through friends and self-teaching using manuals and handbook given during courses of study at the university. The aforementioned studies described ICT skills development among the different population but none identified how gender and psychosocial factors influenced ICT skills development in Nigeria. This study achieved this. As highlighted earlier in this study, Psychosocial factors comprised of social interaction, more knowledgeable other (MKO), and zone of proximal development (ZPD). This was supported by Zaretskii (2009) who outlined them as basic themes of Lev Vygotsky theory of Psychosocial Development.

Social interaction refers to how well a student perceives that social interaction among his/her peers can influence their ICT skills development. Scheinkman (1999) stated that social interactions refer to some forms of externalities, in which the actions of a reference group affect an individual's preferences. Scheinkman (1999) further explained that the reference group could be an individual's friends, family members, neighbours, or classmates. A person's actions may be influenced not only because of the direct change in some fundamental issues but also because of peer influence (Scheinkman, 1999; Horst, 2006). This means that the development of ICT skills can be affected by the social interaction of the learner with the friends, classmates and the teachers who play a very important role in the cognition of the skills.

A more knowledgeable other (MKO) is anyone who has a better understanding or a higher ability than the learner, concerning particular activities or processes. The MKO could be a teacher, coach, or older adult, peers, a younger person, or even computers. This implies that ICT skills can be learnt through these people mentioned. The zone of proximal development (ZPD), according to Zaretskii (2009), is the distance between a learners' ability to perform a task while under supervision and the learners' ability to perform a task independently. Learning occurred in this zone and likewise learning of ICT skills can take place between those with lower ICT skills and those with higher ICT skills. The main objective of this study was to examine the influence of gender and psychosocial factors on the development of ICT skills among students in postgraduate degree programmes in the University of Ibadan. Also to investigate the training needs among the study population.

Research Questions

The following research questions were answered in this study:

1. What are the levels of ICT skills development of male and female students in the study population?
2. What are the psychosocial factors affecting ICT skills development among the study population?
3. What are the types of training required for ICT skills development by the study population?

Research Hypotheses

H_{o1}: There is no significant relationship between gender and ICT skills development among the study population

H_{02}: Psychosocial factors do not significantly influence ICT skills development among the study population

H_{03}: There is no significant joint influence of gender, psychosocial factors on ICT skills development among students in postgraduate degree programmes in the University of Ibadan.

Methods

This study adopted a survey research design. The study population comprised of students enrolled in the postgraduate degree programmes of the University of Ibadan. According to the 2017/2018 data from the university academic planning unit, the total number of postgraduates' students stands at 15,712 in all the twenty-four (24) faculties, institutes and centres of the University of Ibadan. Out of all the 24 faculties, institutes and centres at the University of Ibadan, only 18 of them participated in the study (Appendix 1). The study adopted the convenience sampling technique in selecting the respondents to the study. According to Gay and Airasian (2003), beyond a population of 5000, population size is almost irrelevant and a sample size of about 400 should be adequate to represent the population. A total of 400 copies of the questionnaire were administered while 398 valid copies were retrieved and considered fit for analysis.

The questionnaire consists of three sections. Section A was used to capture information relating to the demographic characteristics of the respondents such as gender, age, and level of education. Section B consists of questions that were used to measure psychosocial factors which include social interaction; interaction with more knowledgeable other; and zone of proximal development; while Section C was used to elicit information on the dependent variable; ICT skills development. Gender consists of

male and female categories, while age was grouped into five categories: 20 – 24 years, 25– 29 years, 30 – 34 years, 35 – 39 years, and 40 years and above. Each of the sub-constructs under psychosocial factors was measured on a 4-point scale ranging from strongly agree = 4, to strongly disagree = 1. The section on ICT skills development was sub-divided into three sections namely computer literacy skills, digital literacy, and ICT complementary skills. In measuring the ICT skills development, respondents were asked to indicate if they have a particular ICT skill or not. These were measured using binary yes or no questions. 'Yes' was coded as 1, 'No' was coded as 0, after which the average score for each respondent was calculated and was used in the analysis.

A pilot study was conducted using 31 postgraduate students from Obafemi Awolowo University, Ile-Ife, Osun State, and the University of Lagos, Akoka, Lagos State. The internal consistency for the variables in the questionnaire was determined using Cronbach Alpha which yielded 0.840 scores for psychosocial factors, and 0.836 for ICT skills development.

Data collected were analysed using the Statistical Package for Social Sciences (SPSS), version 20. The descriptive statistical tools like frequency count and percentages were used to give a descriptive analysis of the data, and answered the research questions, while Chi-square tests of association, Spearman's rank correlation, and regression analysis were also used.

Results

Demographic Characteristics

Table 1 revealed the frequency distributions of respondents' sex. A total of 158 (39.7%) respondents were males, while 240 (60.3%) were females.

Table 1: Sex of Respondents (N=398)

Sex	Frequency	Percentage (%)
Male	158	39.7%
Female	240	60.3%

Table 2 showed the respondents' age range, with 25 - 29 years having the highest frequency 216 (54.3%), followed by 20 - 24 years (26.8%) and 35 - 39 years having the lowest frequency 9 (2.26).

Table 2: Age of Respondents (N=398)

Age Range	Frequency	Percentage (%)
20 – 24 years	107	26.8
25– 29 years	216	54.3
30 – 34 years	54	13.6
35 – 39 years	9	2.26
40 years and above	12	3.01

Table 3 showed that majority of the respondents were Master Degree students with a frequency of 363 (91.2%), followed by PhD students who were 22 (5.5%), 11 (2.8%) were MPhil/PhD students and 2 (0.5%) were Postgraduate Diploma (PGD) students.

Table 3: Level of Education of Respondents (N=398)

Level of Education	Frequency	Percentage (%)
PhD	22	5.5
MPhil/PhD	11	2.8
MSc	363	91.2
PGD	2	0.5

Research Question 1: What are the levels of ICT skills development of male and female students in the study population?

The level of ICT skills development of male and female in postgraduate degree programmes in the University of Ibadan is presented in Table 4.

Table 4: Cross Tabulation of Gender and ICT Skills Development Level

			ICT Skills Developed Level			
			Basic ICT Skills Developed	Intermediate ICT Skills Developed	Advanced ICT Skills Developed	Total
Gender	Male	Count	12	67	79	158
		% within Gender	7.6%	42.4%	50.0%	100.0%
		% within ICT Skills Developed Level	32.4%	30.3%	56.4%	39.7%
	Female	Count	25	154	61	240
		% within Gender	10.4%	64.2%	25.4%	100.0%
		% within ICT Skills Developed Level	67.6%	69.7%	43.6%	60.3%
Total		Count	37	221	140	398
		% within Gender	9.3%	55.5%	35.2%	100.0%
		% within ICT Skills	100.0%	100.0%	100.0%	100.0%

The results from Table 4 showed the distribution of male students according to the level of ICT skills; basic 12 (7.6%), intermediate 67 (42.4%), and advanced 79 (50%) ICT skills, while female students have basic 25 (10.4%), intermediate 154 (64.2%), advanced 61 (25.4%) ICT skills. Comparing the descriptive results for both males and females, half of the male students (50%) have advanced skills while only a quarter (25.4%) of the females have advanced ICT skills, it can therefore be concluded that males are the more developed in ICT skills.

Research Question 2: What are the psychosocial factors affecting ICT skills development among the study population?

Table 5 showed the psychosocial factors affecting the development of ICT skills among postgraduate students in the University of Ibadan.

Table 5: Spearman Rank Correlation between Psychosocial Factors and ICT Skills Development

		ICT Skill Development
Social Interaction	Correlation Coefficient	0.276
	Sig. (2-tailed)	**0.000**
	N	397
Interaction With More Knowledgeable Other	Correlation Coefficient	0.325
	Sig. (2-tailed)	**0.000**
	N	398
Zone of Proximal Development	Correlation Coefficient	0.095
	Sig. (2-tailed)	0.057
	N	398

Correlation is significant at the 0.05 level (2-tailed)

Table 5 indicated a significant positive and weak correlation between social interaction and ICT skills development (P < 0.05, r = 0.276). It also showed a significant positive and weak correlation between interaction with more knowledgeable other (P < 0.05, r = 0.325) and ICT skills development as the P-values are less than 0.05. Zone of proximal development (P > 0.05, r = -0.095) has no significant relationship with ICT skills development, as the P-value > 0.05. Therefore, it can be deduced that social interaction, interaction with more knowledgeable other affect ICT skills development.

Research Question 3: What are the types of training required for ICT skills development by the study population?

To answer this research question, respondents indicate the ICT skill(s) they plan to acquire between the time when this study was conducted and the following year. Figure 1 showed the various ICT skills training required by students in postgraduate degree programmes in the University of Ibadan.

Figure 1: ICT Training respondents desire
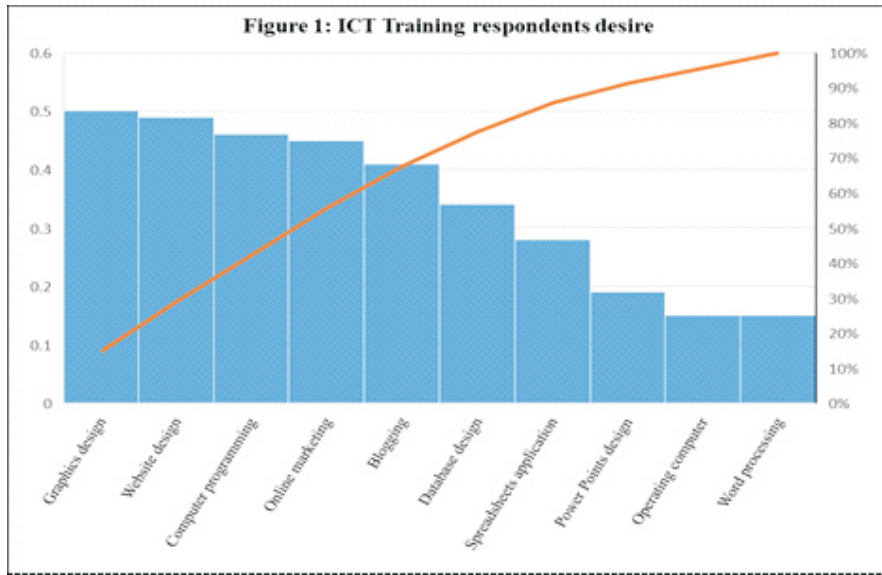
According to Figure 1, the largest percentage (78.9%) of the respondents need graphic design skill, this was followed by website design (74.4%), computer programming (73.9%), and online marketing (72.4%). Fewer respondents indicated that they need skills to operate computers (20.8%) as well as word processing skill (20.8%), which are basic skills needed for classwork, assignments and projects. The mean of the responses showing the needed skills by the respondents was presented in Figure 1.

Test of Hypotheses

Hypothesis H_{o1}: There is no significant relationship between gender and ICT skills development among the study population

The result of the test of hypothesis H_{01} was presented in Table 6:

Table 6: Chi -Square Test of Association between Individual Characteristics and ICT Skill Development (N = 398)

Individual characteristics	Pearson chi-square value	Df	Asymp. Sig. (2 sided)	Remarks
Gender * ICT Skills Developed Level	20.798a	2	0.000	Significant

The result indicates that there is a significant relationship between gender and ICT skills development (X^2 (df = 2, N = 398) = 20.798, P<0.05). This also shows a significant association between gender and ICT skills developed among postgraduate students.

Hypothesis H$_{02}$: Psychosocial factors do not significantly influence ICT skills development among the study population

The result of the test of hypothesis H$_{02}$ was presented in Table 7:

Table 7: ANOVA Table for the Regression Analysis for Hypothesis Two

Model	Sum of Squares	Df	Mean Square	F	Sig	Significance
Regression	17.760	3	5.920	17.073	0.000	Significant
Residual	136.265	393	0.347			
Total	154.025	396				
R = 0.340						
Adjusted R Square = 0.109						

The dependent variable was ICT skills development

Table 7 revealed psychosocial factors had a significant influence on the ICT skills development of the postgraduate students ($F_{(3, 393)}$ = 17.073, P < 0.05).

Table 8: Coefficient Table for the Regression Analysis for Hypothesis Two

Model	Unstandardized Coefficients		Standardized coefficient	T	Sig.
	B	Std. Error	β		
Constant	.731	.215		3.403	**0.001**
Social interaction	.027	.013	0.123	1.987	**0.048**
Interaction with MKO	.060	.014	0.266	4.306	**0.000**
Zone of proximal development	-.029	.027	-0.056	-1.094	0.275

Table 8 presented information on the contribution of psychosocial factors towards ICT skills development among postgraduate students. It revealed that social interaction ($β = 0.123$, P < 0.005), and interaction with more knowledgeable other ($β = 0.266$, P < 0.005) as having a significant influence on ICT skills development among postgraduate students. It also revealed that the zone of proximal development ($β = -0.056$, P > 0.05) had no significant influence on ICT skills development among postgraduate students, as P > 0.05.

Hypothesis H$_{03}$: There is no significant joint influence of gender, psychosocial factors on ICT skills development among students in postgraduate degree programmes in the University of Ibadan

The result of the test of hypothesis H$_{03}$ was presented in Table 9:

Table 9: ANOVA Table for the Regression Analysis for Hypothesis Three

Model	Sum of Squares	Df	Mean Square	F	Sig	Significance
Regression	22.830	4	5.708	17.054	0.000	Significant
Residual	131.195	392	0.335			
Total	154.025	396				
R = 0.385						
Adjusted R Square = 0.140						

The dependent variable was ICT skill development

This test was meant to show the variation by gender. Table 9 reveals that gender and psychosocial factors have a significant influence on ICT skills development (F$_{(4,392)}$ = 17.054, P < 0.05).

Model	Unstandardized Coefficients		Standardized coefficient	T	Sig.
	B	Std. Error	β		
Constant	1.215	0.245		4.960	0.000
Gender	-0.234	0.060	-0.183	-3.892	**0.000**
Social interaction	0.022	0.013	0.101	1.646	0.101
Interaction with MKO	0.059	0.014	0.260	4.277	**0.000**
Zone of proximal development	-0.029	0.026	-0.056	-1.118	0.264

Table 10 revealed that gender (β = -0.183, P < 0.05), and interaction with more knowledgeable other (β = 0.260, P < 0.05) had a significant influence on ICT skills development among students in postgraduate degree programmes in University of Ibadan. It also revealed that social interaction (β = 0.101, P > 0.05) had no significant influence on ICT skills development among postgraduate students, because P > 0.05.

The result for the test of hypothesis H$_{03}$ was used to draw the resultant research model since it showed the influence of all the independent variables (gender, social interaction, interaction with more knowledgeable other, and zone of proximal development) on the dependent variable (ICT skills development), see Figure 1.
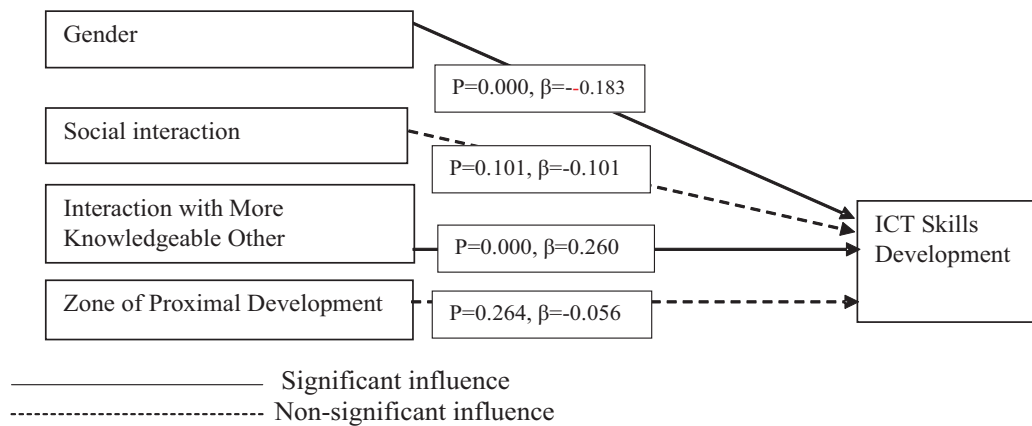
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┌─────────────────────────────┐
│ Gender                      │
└─────────────────────────────┘
            ┌──────────────────────┐
            │ P=0.000, β=--0.183   │
            └──────────────────────┘
┌─────────────────────────────┐
│ Social interaction          │
└─────────────────────────────┘
            ┌──────────────────────┐
            │ P=0.101, β=-0.101    │
            └──────────────────────┘
┌─────────────────────────────┐
│ Interaction with More       │
│ Knowledgeable Other         │
└─────────────────────────────┘
            ┌──────────────────────┐
            │ P=0.000, β=0.260     │
            └──────────────────────┘
┌─────────────────────────────┐
│ Zone of Proximal Development│
└─────────────────────────────┘
            ┌──────────────────────┐
            │ P=0.264, β=-0.056    │
            └──────────────────────┘

                                    ┌──────────────┐
                                    │ ICT Skills   │
                                    │ Development  │
                                    └──────────────┘
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——————————————— Significant influence
------------------------------ Non-significant influence

Figure 1: Research model

Discussion of Findings

The findings showed that male postgraduate students are more developed in ICT skills because they have more intermediate and advanced skills compared to female postgraduate students who have mainly basic and intermediate ICT skills. The finding agrees with that of Ojeniyi and Adetimirin (2013) which says male students use ICT skills more, the finding disagrees with the study by Obasuyi (2015) which specifies that there is no significant difference between male and female students' ICT skills. Further, social interaction and interaction with more knowledgeable other constitute the psychosocial factors that affect the ICT skills development among the postgraduate students. The result also shows that the students plan to acquire training imminently on graphics design, website design, computer programming, and online marketing among others. Finding from this study corroborates with the report of International Telecommunication Union (2014) which described the types of ICT skills required to succeed in the workplace and the complementary skills that are deemed necessary for employment.

In relation to the study's hypotheses, findings revealed that gender significant influence ICT skills development of the students. This agrees with the findings of Ojeniyi and Adetimirin (2013) which stated that there is a significant influence of gender on ICT skills development. This is further strengthened through the study of Mwewa, Samuel and Musonda (2014) which revealed that the gender of a student positively affects ICT skills development. This is in contrast to the study by Obasuyi (2015) which pointed out that gender does not influence students' ICT skills.

It is also revealed that interaction with more knowledgeable other significantly influence ICT skills development of the students. This is in line with the study by Edumadze and Owusu (2013) who opined that the knowledge and ICT skills of lecturers' predicted the level of ICT integration in their teaching process. Lastly, the result

revealed that both gender and psychosocial factors, influences ICT skills development among students in postgraduate degree programmes in the University of Ibadan.

Conclusion and Recommendations

It is concluded in the study that, gender and psychosocial factors significantly influenced the ICT skills development among postgraduate students. It was also concluded that male students are more developed in ICT skills and that ICT skills can be developed through conscious efforts such as training, and interaction with more knowledgeable other. In line with the findings, the following recommendations were made:

1. Female students should be encouraged to learn and acquire advanced ICT skills.

2. The University should provide free seminars and courses for students who are interested in developing ICT skills

3. Scholarship opportunities should be made available by the government and other institutions to help students learn ICT skills.

4. The ICT skills should be part of the curriculum, and staff should be trained on how to effectively teach them to the students.

5. Government and non-governmental organisation should provide ICT hubs all over the country so that there will be room for general ICT skills development.

References

Andersen, B., Howells, J., Hull, R., Miles, I. and Roberts, J. (2000). (Eds.), *Knowledge and Innovation in the New Service Economy*. Edward Elgar: Cheltenham.

Asgarkhani, M. & Wan J. (2008). A Pilot Study of Current Trends in Information and Communication Technology (ICT) Education Within the Tertiary Sector. *Contemporary Management Research*, 4(4), 291-304

Bassey, B. C. & Ushie, A. M. (2013). The Role of ICT in Skilled Manpower Development Through Vocational Technical Education among Higher Institutions in Cross River State, Nigeria. *International Journal of Vocational and Technical Education*, 5(5), 92-99. doi:10.5897/IJVTE2013.0132 Retrieved from http://www.academicjournals.org/IJVTE

B-HERT (2002). Enhancing the Learning and Employability of Graduates: The Role of Generic Skills. Position paper no.9, Business Education Roundtable, HREF. Retrieved August, 2017 from http://www.bhert.com/publication_ PolicyStatements.htm

Edumadze, J. K. E. & Owusu, A. A. (2013). Use of Information and Communication Technology for Teaching and Learning in Ghanaian Universities: Case of University of Cape Coast. *International Journal of Computing Academic Research*, 2(6), 266-277. ISSN 2305-9184 Middle East Association of

Computer Science Publications. Retrieved from http://www.meacse.org/ijcar

Elsaadani, M. (2015). Information and Communication Technology Skills' Sufficiency of Egyptian Accounting Graduates. *International Journal of Advanced Information Technology), 5*(12).

Eze, U. F. (2013). Integrating ICT in Re-Branding Nigerian Youths for Constructive Empowerment and Mental Reengineering. *Journal of Business and Management.* 11(2).

Garrido, M. Sullivan, J. & Gordon, A. (2012). Understanding The Links Between ICT Skills Training and Employability: An Analytical Framework. *Information Technologies and International Development*, 8(2), 17-32.

Gay, L. R. & Airasian, P. (2003). Educational Research: Competencies for Analysis and Applications, 7th ed., Pearson Education, Inc, Upper Saddle River, New Jersey. Retrieved on 20 April 2019 from http://englishlangkan.com/produk/ E%20Book%20Educational%20Research%20L%20R%20Gay%20Pea rson%202012.pdf

Haddon, L. (2001). Social Exclusion and Information and Communication Technologies. *New Media and Society*, 2(4), 387–406.

Hassan B. Babawuro S. Muhammad S. S. and Yahya B. (2013). ICT Skills for Technical and Vocational Education Graduates' Employability. *World Applied Sciences Journal*, 23(2), 204 -207.

Ifejiofor, A. P. & Nwankwo, C. A. (2015). The Undercurrents of ICT Skill Acquisition in Nigeria: Problems and Prospects. *International Journal of Research in Business Studies and Management*, 2(8), 1-7. ISSN 2394-5923 (Print) & ISSN 2394-5931 (Online). August 2015

International Telecommunication Union. (2014). Digital opportunities: Innovative ICT solutions for Youth Employment Report. Retrieved on 6 September 2019 from https://www.itu.int/en/ITU-D/DigitalInclusion/Youth-and-Children.

Israel, O. & Ediseri, E. (2014). ICT skills and Internet Usage of Undergraduates of Library and Information Science Departments of Delta and Edo States Universities. *International Journal of Library and Information Science*. 6(5), 98-107. doi: 10.5897/IJLIS2013.0360 http://www.academicjournals. org/IJLIS

Keeley, B. & Céline L. (2017). The State of the World's Children 2017: *Children in a Digital World*. UNICEF. 3 United Nations Plaza, New York.

Mohamed, H. Judi, H. M. Nor, S. F. M. & Yusof, Z. M. (2012). Bridging the Digital Divide and ICT Literacy among Students in Malaysian Rural Areas. *Australian Journal of Basic and Applied Sciences*, 6(7), 39-45, 2012 ISSN 1991-8178

Mohammed, A. (2007). Automation in University Libraries of Nigeria: a Review. *Trends in Information Management*, 3 (2), 109-122.

Mwewa P. Samuel B. E. & Musonda A. (2012). An Investigation into the Development of ICT Skills among Mathematics Students in Higher Learning Institutions: A Case of Mukuba University. *International Journal of Science and Research* 3(7), 257-272

Nisar M. W, Munir E. U. and Shad S. A. (2011). Usage and Impact of ICT in Education Sector; A Study of Pakistan. *Australian Journal of Basic and Applied Sciences*, 5(12), 578-583, ISSN 1991-8178.

Obasuyi, L. O. (2015). Information and Communication Technology Literacy Skills and Class Instruction: a Comprehensive Perception Survey of University of Benin First Year Students. *Journal of Information Literacy in Higher Education*, 7(1), 63-79. doi: 10.15845/noril.v7i1.222

Odede I. & Enakerakpo E. (2013) Educational Challenges and Prospects of Using Internet among Library and Information Science Students of Delta State University, Abraka and Ambrose Ali University, Ekpoma, *Nigeria, Journal of Research in Education and Society*, 4(3), 72-79.

Ogunsola K. & Adekola A. (2019). Institutional Factors Influencing Internet Use among Postgraduate Students in Selected Universities in South-western Nigeria. *African Journal of Theory and Practice of Educational Research*, 6, 131-141.

Ogunsola, K. & Adesakin, M.A. (2020): Individual Characteristics and Social Learning Modelling Factors Influencing ICT Skills Development among Postgraduate Students at the University of Ibadan, Ibadan, Nigeria. Accepted for publication in *Social Informatics, Business, Politics, Law and Technology Journal*, 6(2).

Ogunsola, K. & Alade, I. A. (2016). Assessment of E-Learning Facilities and Their Utilization in Curriculum Delivery of Colleges of Education Programmes in Lagos State, Nigeria. *African Journal of Theory and Practice of Educational Assessment*, 4, 64-77.

Ojeniyi A. & Adetimirin A. (2013). Gender Influence on ICT Use by Undergraduates in Two University Libraries in Nigeria. *Computer Communication and Collaboration*, 1, 62-71

Petit, P. (1995). Employment and Technical Change. In Stoneman, P. (Ed.) *Handbook of the Economics of Innovation and Technical Change*. Blackwell, Oxford.

Scheinkman, J. A. (n.d.) Social Interactions (Internet). Princeton University and National Bureau of Economic Research. Retrieved from https://www.princeton.edu/~joses/wp/socialinteractions.pdf

Sukanta, S. (2012). The Role of Information and Communication Technology (ICT) in Higher education for the 21st century. *The Science Probe*, 1(1), 30 – 41.

Tariq, V. N. & Cochrane, A. C. (2003). Reflections on key skills: implementing change in a traditional university. *Journal of Education Policy*, 18(5), 481-498.

Vladimir L. (2002). ICT Skills and Employment. OECD Science, Technology and Industry Working Papers 2002/10. Retrieved 4 October 2019 from https://www.oecd-ilibrary.org/docserver/110542373678.pdf?expires=1600350398&id=id&accname=guest&checksum=70666CAB1E2612EEE51FF9621A36FAFD

Walsh, E., Gazala, M. & Ham, C. (2001). The truth about the digital divide. In B. Compaine (Ed.). *The digital divide: Facing a crisis or creating a myth?* 279–284. The MIT Press: Cambridge, MA.

Werquin, P. (2010). Recognition of Non-Formal and Informal Learning: Country Practices. Organisation for Economic Co-Operation and Development. Retrieved 3 December 2019 from https://www.oecd.org/education/skills-beyond-school/44600408.pdf

World Bank (2007). Education for All. Retrieved from http://web.worldbank.org/website/exterm/topicsexted

World Bank Live (2016). Information and Communications Technologies for Development. http://live.worldbank.org/information-communications-technology-development

Zaretskii, V. (2009). The Zone of Proximal Development: What Vygotsky Did Not Have Time to Write. *Journal of Russian and East European Psychology*, 47, 70-93.http://dx.doi.org/10.2753/RPO1061-0405470604

Appendix I

Faculty, Institutes, and Centres involved in the Study

1.	Africa Regional Centre for Information Science
2.	Centre for Entrepreneurship and Innovation
3.	Centre for Petroleum, Energy, Economics and Law
4.	Centre for Sustainable Development
5.	Faculty of Agriculture and Forestry
6.	Faculty of Arts
7.	Faculty of Basic Medical Sciences
8.	Faculty of Education
9.	Faculty of Law
10.	Faculty of Pharmacy
11.	Faculty of Public Health
12.	Faculty of Science
13.	Faculty of Technology
14.	Faculty of the Social Sciences
15.	Faculty of Veterinary Medicine
16.	Institute of African Studies
17.	Institute of Child Health
18.	Institute of Education