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Gender, Computer Access and Use as Predictors of Nigerian Undergraduates' Computer Proficiency (Pp. 61-78)

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Abstract
This study X-rayed the contributions of gender, access to computer and computer use to the Nigerian undergraduates' computer proficiency. Three hundred and fifteen (315) undergraduates from the Faculty of Education of Olabisi Onabanjo University, Nigeria served as the sample for this study. The instruments used for the data collection were Computer Access and Usage Scale (CAUS) and Computer Proficiency Scale (CPS). The data collected were analysed using simple percentages, standard deviation, Analysis of Variance and Multiple regression statistics. Meanwhile, the findings revealed that gender, access to computer and computer usage jointly predicted the student's computer proficiency. However, gender had the least predictive power of the criterion variable. Recommendations based on the outcome of this study were highlighted in this paper.

Keywords: Gender, Computer-access, Computer Use, Undergraduates, Computer Proficiency

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Introduction

In the recent time, computer technology is beginning to anchor societal activities. Every sector of life at the global level is quite experiencing exponential growth in the use of computer technologies (Cardel & Nickel, 2003; Volman, Van-Eck, Heemskerk, & Kuiper, 2005). As a matter of fact, Corbett and Willms (2002) succinctly observed that rapid growth in Information and Communication Technology (ICT) has led to the diffusion of technology in the education sector. There are concrete and specific roles of computers in society and schools. The nature of transformation ICT has made in politics, business, and more importantly in education is creating a significant demand for graduates who are highly skilled in terms of performance and delivery through the use of various computer technologies (Selwyn, 2007; Burger, 2004; Cardel & Nickel, 2003). Computer technology constitutes a powerful tool that facilitates instructional process at all levels of education (Saleh 2008; kwache, 2007; Usun, 2004; Papastergiou & Solomonidou, 2005; Williams and Duarte, 2002). Hence, researchers are getting more concerned about learners' scholastic and extra-scholastic practices and preferences regarding computers (Mumtaz, 2001; Miller, Schweingruber & Brandenburg, 2001).

In developed countries, student's first encounter with computers had been in the kindergarten (Wallace & Clariana, 2005). Meanwhile, it seems college and university students in developing countries like Nigeria are bracing up in the use of computer technologies (digital cameras, MP3 player, video games, and cell-phones). In developed nations, there are a large number of government and private initiatives to provide computers in the various citadel of learning (Wainer, et' al, 2008). Education industry in developing countries need to keep up with the changes brought about by ICT innovations because Corbett and Willms (2002) and Kuhlemeier and Hemker (2007) have noted that failure to adopt computer technology in schools results in student's incompetence in computer usage which could put schools and the students in disadvantaged position.

Computer proficiency is essential for success in academic pursuit, and the labour- market, hence it is valued by employers because it is assumed that graduates must have possessed the minimum level of computer skills that would enhance performance and productivity (Hashim & Mustapha, 2004; Cardel & Nickel, 2003). It is for this reason introductory course in computer is becoming mandatory for students in developing and developed countries

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so as to enhance their acquisition of necessary skills in computer usage. Moody, Stewart, and Bolt-Lee (2002) observed that computer literacy has been found to be the second skill after communication skill required of potential employees. Dickerson (2004) also alluded to the fact that employees need computer skills.

Undergraduates who transform to employees need to be computer proficient because, they are sometimes expected to communicate via email, participate in discussion board, analyse data using SPSS, make presentations using PowerPoint, etc. Bradlow, Hoch and Hatchinson (2002), Wallace and Clariana (2005) noted that in developed countries, computer proficiency is becoming one of the major pre-requisites for student's admission into colleges and universities, while Cardel and Nickel (2003) pointed to the fact that some institutions in developed countries have specificied computer competency level students must attain at the point of graduation. In the recent time, researches on computer proficiency have shown revealed that there is a wide variation in the student's ability and general computer aptitude (Evans & Simkin, 1989); efficiency and high level of students' productivity within and outside the school is greatly enhanced by possession of computer knowledge and skills (Yusuf, 2005; Mutula, 2003); the amount of technologies and its sophistication will not put technologies into use unless students have the skills, knowledge and attitude necessary to maximize its potentials in education (Baylor & Ritchie, 2002); computer literacy is the foundation students need to carry on in their academic career (McCade, 2001).

The influence of gender on perceptions, attitude and effective use of computer technologies is becoming an issue of concern in the recent time to researchers and scholars. Gender differences have been noted to exist in students' use and access to computer irrespective of availability and place of access (Janssen Reinen & Plomp, 1997). Computer tasks are often attributed to men and boys than to women and girls, while computer use in schools has been traditionally attached to masculine subjects in sciences and mathematics than feminine subjects in Arts and Humanities (Whitley, 1997). Levin and Gordon (1989) observed that parents buy computers at home early if they have son(s) at home. Some of the factors that contribute to gender-digital-divide include family background, income, class, educational level, race, geographical location, parental encouragement towards boys, level of involvement in domestic chores, sex roles stereotype, male-oriented

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computer games, males early socialization (Norris, 2001; Schumacher & Moraham-Martin, 2001; Fountain, 2000).
Previous studies in of respect gender and computer access and usage indicate that: there are persistent gender difference in computer attitude (Hashim & Mustapha, 2004; Huber & Schofield, 1998; Durndell & Thomson, 1997); girls are less enthusiastic than boys (Volman & Van Eck, 2001); girls use ICT lesser than boys (Janssen Reinen & Plomp, 1997); males are more engaged in entertainment related activities, while girls mostly use computer as information and communication tool (Papastergiou & Solomonidou, 2005; Levine & Donitsaschmidt, 1998); males are less anxious and more confident about computer usage (Cuban, 2000).

In the early 60s, not many people had computer experience, but today children are beginning to use computer at home and in the school for pleasure and academic purposes. Advances in software tools have increased people's use of computer technology, while computer usage by university undergraduates is one of the factors that determine their success or failure (Papastergiou & Solomonidou, 2005). Besides, Cuban (2000) noted that students' use of ICT is to make positive impact in their learning outcomes and increase their competency in the use of technologies. Consistent students' use of computers is more or less an integral part of the instructional process. Reasonable number of learners tends to have more time at home to engage the computers in various activities which facilitates their learning ability and improve their computer literacy level. Selwyn (1998) further argued that this is the reason why many parents strive to procure computers at home for their children.

Available literature on computer use reveal that student are increasingly encouraged in the school to use computers for assignments (Comber, Watling, Lawson, Cavendish, McEune & Paterson, 2002); students gained more computer experience from home (Van Braak & Kavadias, 2005; Ruthven, Hennessy & Deaney, 2005; Livingstone, 2002; Kirkman, 1993); the use of computers in the school is relatively public, collaborative and closely supervised, while computer use at home is largely private, solitatry with ample opportunities for exploration and experimentation (Kerawalla & Crook, 2002); greater use of computers at home reduces students level of anxiety (Basile & D'Aquila, 2002; Colley, Gale & Haris, 1994). cognitive and affective attitudes are two important predictors of computer use (Kay, 1993). Studies have also shown that students' use of computers are greatly

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influenced by; cost of procuring the device (Leuthold, 1998); perceived usefulness of computer knowledge, computer self-efficacy (Saleh, 2008) and early training in computer use (Leuthold, 1998).

Equitable access to computers in the school and at home is one of the paramount indices of child's development because students who do not have such access are majorly "at risk" of being behind. Students from average socio-economic background more often than not rely more heavily on computers available in the school and other public places so as to meet up with the academic demands (Reddick, Boncher & Grosseilliers, 2000). There is an indication that not all learners as required have equal access to computers both at home and in the school, hence Papastergiou and Solomonidou (2005) submitted that those who are granted better access to computers gain immeasurable motivation and computer skills.

Various research findings in respect of students' computer access revealed that: access to computers contributes to students' academic improvement (Wainer et' al, 2008; Corbett & Willms, 2002; Owston & Wideman, 2001; Mann, 1997); students who have access to computers at home for educational purposes demonstrate improved scores in reading and mathematics (Organisation for Economic Cooperation and Development, 2006); students with no computer experience have more negative attitude towards computers (Hashim & Mustapha, 2004).

The issue of gender gap in technology usage is gaining ground and attracting the attention of academic-researchers. Busch (1995) in Mckenzie (2002) succinctly noted that a gender difference towards computer affects individual's interest, attitude towards computers and its use. As a matter of fact, if gender is related to computer anxiety and, then the issue of gender is so relevant in this age when considering students' proficiency level in computer usage. Computer proficiency is an important indicator of the potentials of not only the teachers but also the students.

Meanwhile, there has been a dearth of information about Nigerian undergraduates' computer proficiency level and the extent to which the variables such as gender, access to computer and computer usage jointly or individually predict undergraduates' level of computer proficiency. This study therefore seeks to find out the extent to which gender, access to

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computer and computer usage will jointly and relatively predict the undergraduates' level of computer proficiency.

Research Questions

The following research questions are raised in respect of this study:

1. What is the joint contribution of gender, access to computer, computer usage to the prediction of students' level of computer proficiency?
2. What is the relative contribution of gender, access to computer, computer usage to the prediction of students' level of computer proficiency?

Methodology

The study adopted a descriptive survey research design of ex-post facto type. Here, there is no manipulation of the variables but the researcher is only interested in determining the influence of the predictor variables on the criterion variables.

The target population for this study comprised of all students of the Faculty of Education of Olabisi Onabanjo University, Ago Iwoye, Nigeria. The sample for this study consisted of three hundred and fifteen (315) undergraduates (males 198 = 62.85%; females 117 = 37.14%) selected from the four departments of the faculty of education, Olabisi Onabanjo University via simple random sample technique. The mean age of the respondents was 23.8 years, while the Standard deviation was 2.71.

Four research assistants were trained on how to administer the instruments. These research assistants helped in the administration and collection of the questionnaires. The questionnaires were later coded and analysed. The data collected were analysed using Simple Percentages, Standard Deviation, Analysis of Variance and Multiple regression.

Two self-developed instruments were used for the collection of the data for this study. The instruments are Computer Access and Usage Scale (CAUS) and Computer Proficiency Scale (CPS).

(a) **Computer Access and Usage Scale (CAUS):** This is a self-developed instrument. The scale was used to collect data on the respondents' access to computer and frequency of computer use. The instrument has two

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sections. Section I elicited information on the demographic data of the respondents, while section II having 8 multiple-choice questions elicited information from the students on their access to computer and their frequency of computer use. The validity of the instrument was ensured by giving the initial instrument to computer science lecturers, experts in questionnaire construction for the evaluation of its adequacy, language, structure and relevance to content coverage. A test re-test method was explored by trial-testing the instrument within two weeks interval on 30 students who were excluded from the sample. Pearson correlation coefficient of the instrument was calculated to obtain a reliability coefficient of 0.78.

(b) **Computer Proficiency Scale (CPS):** This instrument was developed by the researcher to collect data on the students' level of proficiency in computer usage. The instrument was designed after that of Bataineh and Baniabdeirahman, (2006). The instrument contains 19 items structured towards determining level of proficiency or competency in handling various computer operations and applications. The instrument was rated on four-point Likert-scale of Not Proficient (1 point), A little proficient (2 point), Fairly proficient (3 point) Proficient (4 point). The instrument was given to two computer science tutors, and a psychometrician for scrutiny. Through a test-retest method within two weeks interval, a reliability coefficient of 0.74 was obtained.

Results

The results in Table 1 indicated that computer proficiency level correlated negatively with gender (r=-.178; p=<.05), computer usage (r= -.221, p = <.05), and access to computer (r= -.291, p = <.05). However, computer usage correlated positively with access to computer (r = .106, p = < .05). This implies that Nigerian undergraduates' are becoming more computer-friendly in terms of usage.

Research question 1: *What is the joint contribution of gender, access to computer, computer usage to the prediction of students' level of computer proficiency?*

The results in Table 2 indicate that gender, access to computer and usage combined to predict students' computer proficiency level. A coefficient of multiple regression (® .382) and adjusted multiple regression (R^2) of .146 were observed. This indicates that 14.6% of students' computer proficiency level was accounted for by the combination of the three independent

variables. The results imply that Nigerian undergraduates are fairly computer proficient. Furthermore, the table also indicates that the analysis of variance of the multiple regression data produced an F-ratio value significant at 0.05 level ($F(3,314) = 17.687$; $P < 0.05$). To determine the contribution of the three independent variables in the prediction of students' computer proficiency, a stepwise regression analysis was taken and the results are shown in Table 3.

Research question 2: *What is the relative contribution of gender, access to computer, computer usage to the prediction of students' level of computer proficiency?*

When access to computer was entered into the model as the first predictor variable based on the strength of relationship with undergraduates students' computer proficiency, R^2 change accounted for 8.5% of the students' computer proficiency (F1, 313 , $R = .291$, $R^2 = .085$; $P > 0.05$). Meanwhile, when computer usage was entered into the model as the next predictor, there was a contribution of 3.3% to the students' computer proficiency (F2, 312, $R = .384$, $R^2 = .121$; $P < 0.05$). As soon as gender entering the model, a significant prediction of 2.3% was also revealed (F3, 311, $R = .382$, $R^2 = .146$; $P < 0.05$). This revealed that the three predictor-variables together predicted 14.6% of the variation of the students' computer proficiency. By implication, the results indicate that Nigerian undergraduates' computer proficiency is most engineered by access to computer, followed by computer use, while gender has the least effect on students' computer proficiency.

The data were subjected to further analysis using Multiple Regression Analysis (MRA) with all the variables entered into the model at the same time to determine the relative contribution of the predictor variables; access to computer, computer usage, gender to the criterion variable; students' students' computer proficiency. Results of the MRA analysis that was tested at .05 significance level indicating the Beta coefficients and t-ratio are presented in Table 4.

The results in Table 4 show the predictor variables in model; the Beta values and the significant t-values of each of the predictor variables against the students' computer proficiency level. The results show that the Beta value for access to computer ($\beta = -.291$; $t = -5.370$) computer usage ($\beta = -.192$; $t = -3.595$) and gender ($\beta = -.158$; $t = -3.002$) are all significant at .05. Therefore, the three independent variables are good predictors of students' computer

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proficiency. This was done to provide evidence of relative importance of the independent variables in accounting for the variations in students' computer proficiency.

Discussion

The findings of this study as indicated in Table 1 revealed that student's computer proficiency level correlated negatively with computer usage and access to computer. As a matter of fact, one would have thought that computer proficiency level should naturally increase as the frequency of computer use increases, but the reasons behind this outcome is still a mystery. This finding contradicts the research outcome of Volman, Van Eck, Meemskerk and Kupier (2005), Selwyn (1998), Corbett and Willms (2002), Fuch and Woessmann (2004) and Mann (1997). Meanwhile, students' computer proficiency level negatively correlating with access to computer could have occurred if student's access to computer was probably affected by time limit, intermittent access, restricted or conditioned access either at home or in the school, disturbances and some other distracting or limiting factors.

Furthermore, the results in Table2 revealed that access to computer, computer use and gender combined effectively to predict students' computer proficiency level. The observed F-ratio of 17.687 significant at .05 level is fairly alright to suggest a good evidence of the combination of the independent variables (access to computer, computer use and gender) in the prediction of students' computer proficiency. However, the coefficient of multiple regression of .382 and a multiple R square of .146 is pointer to the magnitude of the relationship between the independent variable and the criterion variables. Therefore, inferring from the data in Table 2, it is cristal clear that a linear relationship of the three predictor variable accounted for 14.6% of the total variance in the Nigerian undergraduates' computer proficiency.

The outcome of this study corroborates previous researches which indicated that, there is a strong relationship between computer ownership and experience, gender, and computer confidence and individual's computer skills competence (Van Braak and Goeman, n.d). Similarly, Loyd and Loyd (1985) and Ogunkola (2008) also confirmed that computer ownership, frequency of use and attitude are good combine-predictors of ones level of computer operations. Also lending support to the outcome of this study are Levin and Gordon (1989) in Karsten and Roth (1998) and Seifer (2005) who

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confirmed that there is a relationship between access to computer and computer use and mastery in basic skills computer.
The results obtained from Table 3 and 4 are revealing, interesting and somehow surprising. Interesting and revealing in that the three variables contributed relatively to the prediction of the criterion variable (students' computer proficiency). Access to computer and computer use respectively were the best and better predictors of students' computer proficiency level because each contributed 8.5% and 3.3% respectively to the prediction, while gender contributed 2.3% to the prediction of the dependent variable. Meanwhile, gender (β = -.158, t = 3.002) was found to be the least significant contributor to the prediction of students' computer proficiency at alpha level 0.05. It is however surprising that gender made the least contribution to the prediction of the criterion variable; this possibly tilts towards the direction that computer usage is no longer a "boys club" contrary to the opinions of, Chaika (n.d), Davies (2000) and Karsten and Roth (1998). Meanwhile, lending support to this finding Loyd and Gressard (1984), Koohang (1989) and Akbulut (2008) found little or no influence of gender on individual's level of computer proficiency.

Conclusion and Recommendations

It is crystal clear that the issue of students' level of computer proficiency transcends the shore of mere acquaintance with the computer hardware. Rather, in addition to having the ability to operate computer, surf the web, communicate via e-mail, download and upload images and chart instant messenger, it also involves the ability to use computer as a tool for organization, communication, research and problem solving purposes. Therefore all stakeholders in education in Nigeria must make concerted efforts to ensure that wards, children and students irrespective of ethnic background, color and socio-status have equitable exposure to computer knowledge and skills acquisition so as to secure and sustain future economic, political and educational development and advancements.

Giving the significance of the findings of this study at this period of the country's yearning towards Information and Communication Technology compliance, there is the need to give adequate attention to the purpose for which students engage themselves with computer. Therefore, teachers, parents and guardians should endeavour to provide ample opportunities for their children to have maximum guided-access to computers at home and in the school to ensure optimum attainment of the necessary proficiency level.

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Every educational discipline has software program peculiar to the nature of their work, students should therefore be exposed to various software programs that would be of interest to them to enhance their academic success and career development

Since this study focused on the contribution of access to computer, computer use and gender to students' level of computer proficiency; further researches can be extended to how some other psychological or motivational variables can predict the criterion variable of this study. Likewise this study can be carried out on the entirety of Olabisi Onabanjo University students in Nigeria, students of higher institutions across the various geo-political zones of Nigeria, lecturers of universities, as well as some other areas not covered by this study.

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Table 1: Correlation Matrix of the Dependent and Independent Variables **(N=315)**

Variables	Mean	Std. Dev	Proficiency	Gender	Computer usage	Access to computer
Proficiency level	52.9111	14.3662	1.000	-.178*	-.221*	-.291*
Gender	1.4413	.49733		1.000	.046	.043
Computer usage	16.7048	4.97943			1.000	.106*
Access computer	3.6413	1.30952				1.000

Table 2: Summary of multiple regression Analysis between the predictor and criterion variables

R= .382 R^2= .146 Standard error of estimate = 13.34233					
ANOVA					
Source of variation	Sum of squares	df	Mean square	F	Sig
Regression	9446.011	3	3148.670	17.687	.000
Residual	55363.500	311	178.018		
Total	64809.511	314			

(a) Predictor: (constant), access to computer, gender, computer usage
(b) Dependent variable: computer proficiency level.

Table 3: Summary of multiple regression analysis (Step wise) between the predictor and criterion variables

Model	R	R^2	Adjusted R square	Std error of the estimate	R square change	df	df2	F change
1	.291 a	.085	.082	13.76756	.086	1	313	.000
2	.348 b	.121	.115	13.51261	.036	1	312	.000
3	.382 c	.146	.138	13.34233	.025	1	311	.003

a predictor: (constant), access to computer
b predictors: (constant), access to computer, computer usage
c predictors: (constant), access to computer, computer usage, gender

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Table 4: Relative contributions of access to computer, computer use and gender to the observed variables in students' computer proficiency level

Model	Under standardized coefficient		Standardized coefficient	t - ratio	sig
	B	Std.error	beta		
Access to computer	-3.191	.593	-.291	-5.370	.000
Computer usage	-.554	.154	-.192	-3.595	.000
Gender	-4.554	1.517	-.158	-3.002	.003

a. Dependent Variable: students' computer proficiency.

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