ICT and Educational Performance:
The Inter-Relationship of Selected Critical Variables

Okorie Nelson
Nigeria

Abstract

This original data-based study set out to measure the use of the internet as an information and communication tool in promoting educational performance and knowledge of Covenant University undergraduates, and analyze the inter-relationship of selected social and demographic and other relevant variables. Four hypotheses were tested and analyzed with the use of Chi square analysis and computed correlation using SPSS. The first hypothesis proposes that there will be significant relationship and correlations between internet usage and the sex of the respondents. The second hypothesis proposes that there will be significant relationship between internet knowledge and the age of the respondents. The third hypothesis proposes that there will be significant relationship between internet knowledge and the academic performance of the respondents. The last hypothesis proposes that there will be significant relationship between internet usage and the academic performance of the respondents. The study revealed some interesting correlation among the critical variables. Based on the finding of the research, some far reaching recommendations are suggested.

Keywords: ICT, education, performance, inter-relationship, variables

Introduction

Information and communication technology has precipitated a revolution in the communication industry with an emphasis on improved methods and efficiency. It guarantees accuracy, efficiency, prompt and instantaneous transmission and distribution of information. Information technology provides near limitless possibilities for increasing quantity and enhancing the quality, speed and availability of information in a complex but increasingly interdependent world of business (Soola, 1998). In addition, the application of ICTs has revolutionized not only the information and communication sector, but the entire facets of human life. It has impacted favorably on the individual, groups, organizations, government and societies. It has provided good governance which has precipitated development in all fronts (Adaja, 2005).

The internet is increasingly being defined by new digital technologies that empower users to develop, create, rate and distribute internet content and applications (O'Reilly, 2005). Generally, the internet is a world wide network of computers networks, connected to each other by telecommunication links. It is made up of an ever growing number of organizations and individuals who have decided to share information in this giant, interconnected open system (Norton & Smith 1996). Okpoko (2006) argued that the principal function of the internet is communication (e-mail), information gathering and electronic marketing. It has been argued that information has replaced capital and labor as the primary economic resource of our time. Information is not only power, it is also the raw material of truth, beauty, creativity, productivity and freedom. In essence, information is central in all form of activity and all sphere of life (Adaja, 2005).

In Africa and the wider world, Nigeria is regarded as a developing nation that is characterized with many challenges truncating developmental programs and policies. These challenges include illiteracy, poverty, ethnicity as well as a low standard of living. These challenges negatively affect the educational sector in Nigeria, but emergence of ICT has precipitated developmental strides in diverse sectors of the economy. This paper examines the use of the Internet as a form of ICT for acquisition and development of knowledge and promotion of academic performance among undergraduate students. Covenant University is used as an example.

Objective of the Study

Against the background described above, a study was conducted to measure the use and knowledge of the internet and how it contributes to academic performance among undergraduate students of Covenant University. This paper reports only the inter-relationship of critical social demographic variables such as age, income, sex and marital status with the emphasis on usage, knowledge and performance.

Hypotheses

The following hypotheses were tested in this study:

> H1: There will be significant relationship between Internet usage and the sex of the respondents.

> H2: There will be significant relationship between Internet knowledge and the age of the respondents.

> H3: There will be significant relationship between Internet usage and the academic performance of the respondents.

> H4: There will be significant relationship between Internet knowledge and the academic performance of the respondents.

Theoretical Framework

This study is hinged on the Use and Gratification theory. The theory deals with way in which different individuals use media and the gratification they derive from its use. Folarin (2001:22) notes the theory is basically concerned with questions of who, which media, which content, under which condition and for what reason? Furthermore, the theory is concerned with what media people use, how the media are used, and what gratification learners expect from its usage. According to West and Turner (2004), this is an extension of the need and motivation in Abraham Maslow's hierarchy of needs. The satisfaction of one need gives rise to another need. Elihu Katz, Blumler Jay G and Gurenvitch Michael were motivated by Maslow's theory to study how people consume mass communication. Their finding gave birth to the Use and Gratification theory. In conclusion, West and Turner (2004: 396) summarize the assumption of the theory as providing a framework for understanding when and how individual media consumers become more or less active and the consequences of that increased or decreased involvement". The theory is relevant to this study to determine how students use the internet as an educational resource.

Brief Review of Related Literature

Information Communication Technologies combine three comparative complementary concepts - information, communication and technology - which describe its desired meaning and the area of coverage. Information is the message that is transmitted and received in the process of communication. This message, idea or feeling is shared by both the receiver and sender at the same time. Communication refers to any process in which people *share* the same information,

ideas and feelings. It involves spoken and written words, body languages, personal mannerisms and style (Hybel and Weaver, 2001).Technology refers to the systematic application of the tools and art. In practice, communication cannot be effective if information is not accurately received by the target audience, the passage of information cannot be complete without the instruments of communication and feedback. Technology makes communication easier, faster and more effective. Today, information and communication technology uses a combination of computer, telecommunication, and information systems services and products. Farnham (1999) defines information and communication technology (ICT) as consisting of hardware, software, telecommunication networks, workstation and robotics and smart chips. Stewart (1994) looks at it as the collection, processing, storage and transmitting information by electronic means.

Information and communication technologies have revolutionized the lives of people. It has brought changes in the social, economic, cultural facets of human life across the globe. ICT has influenced a revolution in communication. Old machines and old ways of communication are abandoned for new technologies, which offer efficiency, speed, quality and reliability. McLuhan (1967) notes that the advent of a new medium often reveals the lineaments and assumptions as it were, of an old medium. Traditional mass media (newspaper, magazine, television and radio) are largely driven by the power of ICT. Newspaper and magazines are refreshingly vibrant in the color, design, and advanced printing technology. Broadcast presentations have a sparkle, clarity, and digital precision that give better picture and sound quality. In many parts of Africa, despite the freedom it offers, ICT media literacy has not been achieved. Ogunshola and Oluwasanmi (2005) in their analysis point out that Africa has 13% of the world's population, but only 2% of the world's telephone lines and 1% of internet connectivity making African peoples slaves rather than masters in the global world.

The most prominent manifestation of ICT in the 21st century is the Internet. The ability of the internet to maintain open standard for transmitting digitized data - voice, video or text - from one computer to another, has constituted its single most important reason of success (Amodu, 2008).The internet is usually referred as an electronic network that links people and information through computers and other digital devices allowing person-to-person communication and sharing of information. The internet with the various information and communication technologies has to a great extent changed our ideas of business, marketing, economy and trade relationships between individuals, organizations and nations. The explosive growth of the internet has created unprecedented opportunities in the field of educational research and practice in the 21st century. The use of the internet in education pedagogy is growing. The impact of using internet resources to enhance educational courses has two principal advantages to students. First, these resources offer a new medium of interaction that complements class room instruction and facilitates learning. Second, they offer students the opportunity to learn and use internet technology and access global resources to support their for future academic and career path (Pierces, Blomeyer & Roberts, 1995).

Today's young people have been called the "Net generation" or "digital generation", given to their fondness for new information technologies and the internet. Ribisi (2001) noted that by the age of 10, young people are more likely to use the internet than adults at any age beyond 25. Nearly, two-third (65.4%) of 10-13 year olds and more than three quarter (75.6%) of 14-17 year olds use the internet.

The Internet offers a significant benefit over other electronic media for educational institutions because it is much cheaper, based on the public networks and open protocols rather than propriety ones, resulting in lower setup and connection costs. In addition, many students and stakeholders are familiar with Internet technology through their own home use and find it less complicated than older technologies. The Internet adds powerful features for managing information, such as tracking, product availability, search and query. It provides students with the opportunity to

develop skills necessary to live, work and play in the 21st century. The Internet allows students to engage in global communication and to access the most current information available (Heise and Grandgenette, 1996).

The internet offers many resources and tools for teachers, scholars and students, such as electronic mail, on-line searches of world libraries, curriculum ideas, software, journals, instructional games, weather data and general information on topics such as politics, global issues and other cultures. Barak and Fisher (2001) note that the benefits of internet based educational technology for complementing standard educational practices are numerous. For example, internet based educational materials provide expert instruction to a very large audience. Their flexibility, reusability, and availability on an any-where any-time basis makes them extremely cost effective. These educational materials can be regularly updated and upgraded to deliver state of the art instruction on a continuous basis. Internet mediated e learning also enables those who reside in remote locations or who are physically confined to receive these educational programs.

Method

For this exploratory study, a survey was carried out in February, 2009 using the sample of Covenant University registered for the 2008-2009 academic session. All Colleges in the University were divided into three groups using a stratified sampling technique. These groups were the College of Human Development, College of Science and Technology and the College of Business and Social Science. Three Departments were then selected from each group by a random sample. The department of Electrical Engineering was selected from the College of Science and Technology; the Department of Mass Communication was selected from the College of Human Development, while the Department of Accounting was selected from the Department of Mass Communication. A sample size of 378 was derived from a population of 7000 undergraduate students of Covenant University by use of a sampling formula i.e. $\mathbf{n = N_{/\,1\,+\,N(e)}}^{\mathbf{2}}$ where N is the population size, e^2 is error margin (level of significance : 0.05) and n is the sample size. A questionnaire was used as the data collection instrument and the data was analyzed for cross tabulation and chi square using SPSS. The hypotheses were tested using the Chi Square Test of Independence at the 5% level of significance (i.e. alpha= 0.05). The Chi Square Test of Independence was chosen because it is a standard measurement test instrument. Secondly, it is used to establish relationship between two variables or establish independence. Chi Square test results were further subjected to the Somer' d directional measure and symmetric measures so as to determine the strength and nature of the relationship using a Statistical Package of Social Sciences (SPSS).

Result

A total of 318 questionnaires were returned, out of the 387 administered, which represents a response rate of 95.7 percent. However, many respondents did not answer some questions. In data analysis, the researcher treated all unsupplied responses as missing cases. Of the number of questionnaires that were received and used, 77 respondents were males representing 23.5% and 227 respondents were females representing 79.5% of the total respondents. In terms of age, 224 respondents (70.4%) were between 15-20, 72 respondents (20.4%) were between 21 and 24 years of age, and 36 respondents (9.2%) were between 25 and 30.

Table 1
Demographic Characteristics of Respondents

Characteristics	Percent
Gender	
Male	23.5
Female	79.5
Total	100
	N= 327
Marital Status	
Single	100
Married	0
Single parent	0
Total	100
	N=327
Age	
15-19	70.4
20-25	20.4
25-29	9.2
30 and above	0
Total	100 N=327
Income	
5,000-30,000	56.9
31000-59000	24.8
60000-150000	2.4
151000-299000	1.8
300,000 AND ABOVE	3.4
Missing system	10.7
Total	100
	N=327

The study revealed that 262 respondents (80.4%) indicated that the internet drives knowledge in the 21st century, while 46 respondents representing 14.1% disagreed that the internet drives knowledge in the 21st century. In addition, 234 respondents (71.6%) revealed that they had adequate knowledge of use of the internet, while 23 respondents representing 7.0% revealed that they didn't have adequate knowledge of the internet. Furthermore, the study revealed that 251 respondents (76.5%) had both internet access at home and at school, while 31 respondents (9.5%) revealed they didn't have access at home or in school. They study also revealed that 295 respondents indicated that they made frequent use of the internet while 14 respondents argued that they don't have frequent usage of the internet.

Table 2
Internet use and research performance of respondents

Categories	Percent
Frequent Usage of Internet	
Strongly Agree	45.6
Agree	44.6
Undecided	2.8
Disagree	4.3
Missing System	2.8
Total	100
	N=327
Knowledge of computer/Internet	
Strongly Agree	71.6
Agree	18.7
Strongly Disagree	7.0
Missing System	2.8
Total	100
	N=327
Internet aids research performance	
Strongly Agree	26.9
Agree	51.4
Undecided	10.4
Disagree	8.6
Missing System	2.8
Total	100
	N=327
Internet access at school	
Strongly Agree	51.1
Agree	25.7
Undecided	11.0
Disagree	9.5
Missing System	2.8
Total	100
	N=327

Testing the Hypothesis

To test our hypotheses, we cross tabulated selected variables and also computed correlations using the SPSS statistical package.

Table 3
Gender – Frequent Use of the Internet

Gender		Frequent Usage of the Internet				
		Strongly Agree	Agree	Undecided	Disagree	Total
Male	Count	9	64	0	14	77
	Expected Count	37.7	33.4	2.3	3.5	77.0
Female	Count	140	78	9	0	227
	Expected Count	113.3	98.6	6.7	10.5	227.0
Total		149	132	9	14	304
		149.0	132.0	9.0	14.0	304.0

Table 3a
Chi-Square Tests

	Value	dl	Asymp. Sig (2-sided)
Pearson Chi-Square	80.577[a]	3	.000
Likelihood Ratio	97.511	3	.000
Linear-by-Linear Association	68.453	1	.000
N of Valid Cases	304		

a. 2 cells (25%) have expected count < 5 The minimum expected count is 2.28

Table 3b
Direct Measures

			Value	Asymp. Std. Error(a)	Approx T(b)	Approx Sig.
Ordinal-by-Ordinal	Somers'd	Symmetric	-.433	.043	-8.618	.000
		Gender Dependent	-.361	.041	-8.618	.000
Frequent Usage of Internet dependent			-.542	.052	-8.618	.000

a. Not assuming the null hypotheses.
b. Using the asymptotic standard error assuming the null hypothesis

Table 3c
Symmetric Measures

	Value	Approx. Signif.
Nominal-by-Nominal Contingency Coefficient	479	.000
N of Valid Cases	304	

a. Not assuming the null hypothesis
b. Using the asymptotic standard error assuming null hypothesis.

Table 4
Age and Knowledge of the Internet

			KNOWLEDGE OF INTERNET			
			STRONGLY AGREE	AGREE	STRONGLY DISAGREE	Total
AGE	15-24	Count	168	46	0	214
		Expected Count	154.9	42.9	16.2	214.0
	25-34	Count	38	15	9	62
		Expected Count	44.9	12.4	4.7	62.0
	34-44	Count	0	0	14	14
		Expected Count	10.1	2.8	1.1	14.0
	45-55	Count	14	0	0	14
		Expected Count	10.1	2.8	1.1	14.0
Total		Count	220	61	23	304
		Expected Count	220.0	61.0	23.0	304.0

Table 4a
Chi-Square Tests

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	199.448 a	6	.000
Likelihood Ratio	119.730	6	.000
Linear-by-Linear Association	42.997	1	.000
N of Valid Cases	304		

a. 5 cells (41.7%) have expected counts less than 5.
b. The minimum expected count is 1.06.

Table 4b
Directional Measures

			Value	Asymp. Std. Error(a)	Approx. T(b)	Approx. Sig.
Ordinal by Ordinal	Somers' d	Symmetric	.256	.060	3.994	.000
		AGE Dependent	.265	.061	3.994	.000
		KNOWLEDGE OF COMPUTER Dependent	.248	.060	3.994	.000

a Not assuming the null hypothesis.
b Using the asymptotic standard error assuming the null hypothesis.

Table 5
Frequent Usage of Internet * Internet Contributes to my Performance

| | | | INTERNET CONTRIBUTES TO MY PERFORMANCE | | | |
			STRONGLY AGREE	AGREE	UNDECIDED	Total
FREQUENT USAGE OF INTERNET	STRONGLY AGREE	Count	60	80	9	149
		Expected Count	44.5	84.8	19.7	149.0
	AGREE	Count	26	101	19	146
		Expected Count	43.6	83.1	19.3	146.0
	UNDECIDED	Count	9	0	0	9
		Expected Count	2.7	5.1	1.2	9.0
	DISAGREE	Count	0	0	14	14
		Expected Count	4.2	8.0	1.8	14.0
Total		Count	95	181	42	318
		Expected Count	95.0	181.0	42.0	318.0

Table 5a
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	135.557 [a]	6	.000
Likelihood Ratio	102.778	6	.000
Linear-by-Linear Association	37.338	1	.000
N of Valid Cases	318		

a. 4 cells (33.3%) have expected count less than 5.
b. The minimum expected count is 1.19

Table 5b
Directional Measures

			Value	Asymp. Std. Error [a]	Approx. T [b]	Approx. Sig.
Ordinal by Ordinal	Somers'd	Symmetric	.260	.056	4.520	.000
		FREQUENT USAGE OF INTERNET Dependent	.260	.056	4.520	.000
		INTERNET CONTRIBUTES TO MY PERFORMANCE Dependent	.261	.057	4.520	.000

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis

Table 5c
Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.547	.000
N of Valid Cases		318	

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 6
Knowledge of Internet * Internet Contributes to my Performance

			INTERNET CONTRIBUTES TO MY PERFORMANCE			Total
			STRONGLY AGREE	AGREE	UNDECIDED	
KNOWLEDGE OF INTERNET	STRONGLY AGREE	Count	86	148	0	234
		Expected Count	69.9	133.2	30.9	234.0
	AGREE	Count	9	33	19	61
		Expected Count	18.2	34.7	8.1	61.0
	STRONGLY DISAGREE	Count	0	0	23	23
		Expected Count	6.9	13.1	3.0	23.0
Total		Count	95	181	42	318
		Expected Count	95.0	181.0	42.0	318.0

Table 6a
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	207.019 a	4	.000
Likelihood Ratio	176.522	4	.000
Linear-by-Linear Association	113.137	1	.000
N of Valid Cases	318		

a. 1 cell (11.1%) has expected count less than 5.
b. The minimum expected count is 3.04.

Table 6b
Directional Measures

			Value	Asymp. Std. Error a	Approx. T b	Approx. Sig.
Ordinal by Ordinal	Somers'd	Symmetric	.494	.044	8.555	.000
		KNOWLEDGE OF INTERNET Dependent	.427	.042	8.555	.000
		INTERNET CONTRIBUTES TO MY PERFORMANCE Dependent	.584	.052	8.555	.000

a. Not assuming the null hypothesis .
b. Using the asymptotic standard error assuming the null hypothesis

Table 6c
Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Contingency Coefficient	.628	.000
N of Valid Cases		318	

a. Not assuming the null hypothesis
b. Using the asymptotic standard error assuming the null hypothesis

Discussion

Modern ICTs has to do with the convergence of computer technology and telecommunication technology. From the literature review, it was determined that the Internet is the information superhighway, a global network of networks connecting millions of computers. Today, the internet is the most technologically advanced medium of communication. It shares digital information through a common set of networking and software protocols (Muciano and Kennedy, 2002, Nsude 2004). The Internet is a major driver of the globalized world in the 21st century. It has also claimed to have the immense ability to change societies.

This study set out to examine the influence of the internet on academic performance by analyzing the relationship between critical variables. Results for each hypothesis were as follows:

H1: There will be significant relationship between Internet usage and the sex of the respondents.

An analysis on gender and the frequent use of the Internet supported the hypothesis as stated. Chi Square analysis on Table 3a, b and c revealed there *was* a relationship between variables, but the relationship was a weak one. Results from the Chi Square tests were significant at the 5% alpha level. Table 3b and 3c help to determine the strength and direction between variables i.e. the approximate significance value has 0.00 in its column; one can infer there was a relationship between the variables. In addition, the value statistics helps to determine the strength or the direction of the relationship, it can range from -1 to 1 i.e. negative value indicates a negative relationship, and positive values indicate a positive relationship. From table 3b and c, the relationship between variables is a weak one. With regards an analysis of age and knowledge of the internet. The hypothesis was upheld. From the available data on table 4a, b and c, the hypothesis was accepted because the asymmetrical values in the Chi Square test were less than 0.05.

H2: There will be significant relationship between Internet knowledge and age of the respondents.

Table 4 b and 4c reveal a positive and strong relationship between variables. This hypothesis focused the significant relationship between frequent use of internet and academic performance. This result supports the assertions of Ribisi (2001) study, whereby he asserted that by the age of 10, young people are more likely to use the internet than adults at any age beyond 25. Nearly, two-third (65.4%) of 10-13 year old and more than three quarter (75.6%) of 14-17 year old use the internet.

H3: There will be significant relationship between Internet usage and the academic performance of the respondents.

This hypothesis was upheld as revealed in tables 5a, 5b and 5c. Table 5a indicated the chi square test with a significance value less than 0.05. This indicates there may be some relationship between the two variables. In this case, there is an asymmetrical value of .000 which is less than 0.05, which means there is a form of relationship at a degree of freedom (df) of 6 with a linear by linear association of 37.338. Tables 5b and 5c indicate that the relationship among the variables is a positive and strong relationship.

H4: There will be significant relationship between Internet knowledge and the academic performance of the respondents

The fourth hypothesis tested the relationship between the knowledge of the internet and academic performance. The data in tables 6a, 6b and 6c confirmed the hypothesis with asymmetrical values in the Chi Square test less than 0.05. Tables 6 b and c reveal that the relationship between variables is a positive and strong relationship.

Recommendations and Conclusions

This study reveals that the internet is an important resource for manpower development as well as educational performance and research. In addition, efforts need to be made to ensure that universities and school of higher learning are ICT driven. In essence, if students and scholars have access to the internet, academic performance is generated. The government must improve the Information and Technology as the educational sector for manpower performance and skill acquisition. In essence, the Internet can effectively contribute to educational advancement rather than obstruct it. Some pre- conditions must been met, such as the provision of infrastructure with provision of subsidized internet subscription and training for students, scholars and researchers. African countries can emulate the positive gains of countries like United Kingdom, Malaysia, and United States of America, among others, where open and free access to the internet is having a significant impact on the quality of education and training. Access to the Internet will encourage computer literacy and educational development in African countries.

References

Adaja, T. (2005). Communication and Strategies for Effective Communication . *Journal of Communication and Society, 4, 33-48.*

Agba, P. (2002). New Communication Technologies in Broadcasting for Enhancing Development. *Nigerian Journal of Communication*.

Amodu, L. (2008). The role of the internet in the sustainable development in rural Africa: A fact or a farce. In Soola, E.O. (Ed), *Health communication, gender violence and ICTs in Nigeria* (pp. 285-296). Ibadan: Ibadan University Press.

Barak, A. & Fisher, W. (2001). Towards an internet driven, theoretical based, innovative approach to sex education. *Journal of Sex Research*, 38(4), 324-332.

Cambell, R.(1998). *Media and Culture: An Introduction to Mass Communication*. Newyork: St Martin Press.

Defleur, L & Dennis, E.(1988). *Understanding Mass Communication*. Boston: Houghton Miffin Company.

Farnham, D. (1999). *Managing in the Business Context*. Institute of Personnel Management.

Folarin, B.(1998).*Theories of Mass Communication*.Ibadan, Nigeria.Sceptre Publishing ltd

Heisse, D & Grandgenette, N.(1996). Perspectives on the use of internet in Art classroom. *Art Education*, 49 (6), 12-16.

Kombol, M. (2006). An Assessment of the Pattern of ICT use among Nigerian media practitioners: Implication for Media Relations practice in Public Relations. *Journal of Nigerian Institute of Public Relations*

Nwuneli, O.(1986). *Key Note Address in Community, Rural Change and Development in Anambra State*. Enugu: Government Printers.

McLuhan, M. (1967). *Understanding media: The extension of man*. London: Sphere Books.

McQuail, D. (1987).*Mass Communication Theory: An Introduction.*Detriot, USA:Sage Publishing

Okpoko, J. (2006).Prospects of Information and Communication Technology on Business operations in Nigeria. Journal *of Nigerian Institute of Public Relations*

Pierce, J., Blomeyer, R. & Roberts, M. (1995). Surfing the internet: A whale of an information source for education researchers. *Educational Researcher*, 24(5), 25-26.

Ribisi, K.(2001). The potential of the internet as a medium to encourage and discourage youth tobacco use. *Tobacco Control*, 12(1), 48-49.

West, R. and Turner, L.(2004*). Introducing communication theory: Analysis and application*. Boston: Mc Graw Hill

About the Author

Okorie Nelson is from the Department of Mass Communication, College of Human Development, Covenant University, Ogun State, Nigeria.

nelsonokorie@yahoo.com