

Computer Ethics And Security Awareness Behaviour Of Tertiary Institution Students In South-Western, Nigeria

¹Oluwabunmi Leah Abolarinwa, ²Muti. A . Tiamiyu, ³Stephen Enyinnaya Eluwa

^{1,2}African Regional Centre for Information Science, University of Ibadan, Nigeria

³Department of Urban & Regional Planning, Universiti Teknologi, Malaysia

¹bunmi.abolarinwa@gmail.com, ³ellis772000@yahoo.com

Abstract

As the digital revolution takes over all facet of socio-economic life of people in this 21st century, it is becoming obvious that remarkable benefits of the cyberspace are being challenged by menace of cyber-crime in Nigeria and other African countries. Thus, prompting various stakeholders to enact laws and measures that could help address this problem. This study examines computer ethics and security awareness behaviour of two tertiary institutions in South-Western part of Nigeria. Through questionnaire survey, 520 students were randomly sampled in the two institutions. Findings from the study revealed that the level of awareness of male students on computer ethics seem to be higher than that of their female counterpart. The older students (31-40 years) tended to be more aware on computer ethics than the younger ones. In terms of computer security awareness, no significant difference was recorded among the gender and different age groups. Findings equally revealed that the number of hours students spent per week using computer and internet has significant influence on their level of computer security and ethics awareness. Those that spent more than 20 hours weekly scored higher in computer security and ethics awareness than those that spent 10 hours or less.

Keywords- *computer ethics, computer security, awareness, Nigeria, tertiary institution*

I. INTRODUCTION

The advent of information age and rapid development of technology have led to the increase in number of computer networks, personal computers, centralized database systems and sophisticated application software. Thus, increasing productivity of business corporations on one hand and on the other hand vulnerability of their information systems. Stamatellos [1] noted that the revolution experienced in the information and communication technology (ICT) over the last couple of decades has expanded the opportunities computer criminals and hackers have to connect to computer networks, manipulate data or steal information. Today, we

are living in a borderless world where national boundaries have been broken as a result of computer revolution which has facilitated the ease at which illegal activities such as spamming, privacy, hacking and attacking of computer through viruses are being perpetrated in cyberspace by computer criminals. In Nigeria, the introduction of cashless society has also increased the risk of being exposed to cybercrimes [2]. Despite this, a lot of end-users are not aware of some ethical questions underlining the creation and application of IT devices. It is apparent that relying solely on technical solutions are unlikely to prevent security breaches because computers are operated by people, which means that human factor comes into play in information system security. Parsons et al. [3] noted that human factor influences how individuals interact with information/computer security technology. Computer insecurity and unethical use have become a global menace that has motivated the need for computer security behaviours and ethics. Computer security is the protection of the integrity, availability, and confidentiality of automated information and the resources used to enter, store, process, and communicate it [4]. According to the author, the three primary goals of computer security are confidentiality, integrity and availability. To address the issue of cybercrimes and unethical practices being carried out in the cyberspace, several countries and international bodies have come up with different laws. However, the various laws enacted by national and international bodies to address the issues relating to computer security and unethical practices have not been able to address all aspects of crime perpetrated in the cyberspace. Fortinet [5] noted it takes a longer time for laws to be enacted whereas cybercrimes are increasing in different dimensions. In the education sector, computer is one of the most important and advanced technology integrated into the educational environment. Computer is a tool embraced by both lecturers and students for research and other purposes. Experts in the field of computer security observed that universities are

among the least secure places in the universe. This is majorly due to the lack of student's awareness of computer security and ethics [6]. Thus, this study examines the perception of tertiary institution students from South Western Nigeria on computer security and ethics awareness. Security awareness refers to users understanding of security measures towards protection of personal data or that of their organization in a cyberspace [7]. Ethics is the field (or moral philosophy) that involves systematizing, defending, and recommending concepts of right and wrong behavior [8]. It refers to actions/behaviour that is morally good or wrong which in the long run affect the society.

II. REVIEW OF EXISTING LITERATURE

According to 2007 Internet crime report released by the Internet Crime Complaint Centre (IC3), Nigeria ranked third among cybercrime committing countries in the world. United States stated in 2007 that individuals reporting fraud-type monetary loss via "Nigerian letter fraud" (Email Scams) received in the United States, constituted 1.1% loss in that year, which puts Nigerian letter fraud at 6.4%, amounting to 1,922.99 million US dollars [9]. Nigerians are at the forefront of internet crimes (fraudulent and financial proposals) committed on daily basis [10]. Money laundering is a very common type of e-crime in Nigeria [11]. Although cybercrimes are performed by people of all ages ranging from young to old, the youths tend to be more involved. Cybercrime or computer-related crimes have gone a long way in tarnishing the reputation of the country among committee of nations. Due to the escalating reports of internet-perpetuated crimes the country seems like a safe haven for computer fraudsters [12]. This has made information security and ethics awareness one of the primary issues discussed in IT and business environments today [13]. The federal government have put several measures to contend and reprimand this worrisome act by Nigerian youths, but it has only yielded little result [12]. According to Aghatise [14] 80% of the cybercrime perpetrators in Nigeria are students from various Institutions. Internet fraud has being embraced by several Nigerian undergraduates as a source of making money; of which some have been caught while others have gotten away and become rich from it [15]. Though several efforts have been made to secure information available on the internet through ethical principles and discourage the unethical use of computers and internet resources, yet security is not achieved [13]. Since majority of those involved in cybercrimes in Nigeria are youths especially those in the institution of higher learning, studies focusing on universities and polytechnics have become necessary. North et al. [16] maintained that education is one of the most effective ways of sensitizing students about the societal impacts of the illegal use of computers and computer systems. Despite this, very few universities are organizing seminars on IT security awareness for its students and staff [17], which has aggravated the lack of

awareness of students on security and computer ethics [18]. In another similar study, the authors investigated how factors such as gender, level of study, and number of years of computer-use influence ethical awareness and security among Universiti Teknologi, Malaysia and International Islamic University Malaysia students. Findings from this study revealed that males, and senior undergraduate students scored higher in ethical behaviour than females and junior undergraduate students. Findings from the study revealed that a higher level of computer ethics awareness was recorded among International Islamic University undergraduate Computer Science students because of their religious inclination coupled with the fact that they were required to take several ethic related courses throughout their study. Whereas undergraduate Computer Science students of Universiti Teknologi Malaysia were less ethical in their behaviour in computer-use, probably because topics on ethics were integrated into Management Information System courses rather than being taught as core courses. Using a sample of 559 Turkish undergraduate students, Akbulut et al. [19] investigated the influence of gender, program of study and PC experience on the ethical use of computer among undergraduate students in the faculty of Education. Results showed that significant differences exist in the ethical use of computer based on gender. Females recorded higher scores on ethics than their male counterpart. In another study, Beycioğlu [20] survey students from faculty of education in a Turkish university, it was reported that female students (potential teachers) ethical judgments on computer use were significantly different than male students (potential teachers).

III. METHOD

The instrument used for data collection (questionnaire) was adapted from that used in past studies. The 10 items measuring computer ethics were adapted from Rosenberg [21], while the 5 that measured awareness of computer security were adapted from North et al. [16]. The items were measured on a five point Likert Scale ranging from 1 strongly disagree to 5 strongly agree. Cronbach Alpha of 0.862 and 0.781 respectively were obtained for the two scales. A total of 520 copies of questionnaire were administered in the two schools. The breakdown shows that out of 250 copies administered to students of Ibadan Polytechnic, 216 were retrieved which gives a response rate of 86.4%. For Moshood Abiola Polytechnic, 220 copies out of the 270 administered were retrieved which gives a response rate of 81.5%. For the data analysis, two analytical techniques — Analysis of variance (ANOVA) and T-test were ad

IV. RESULTS

Table 1 Reports summary statistics for the demographic composition of respondents: Majority (72.3%) are in the age brackets of 21-30 years. Some 53.9% are male. Among the respondents, 29.7% are from the management studies

faculty, 25.7% from engineering, 19.8% from science, 13.3% from environmental studies and 11.5% from business communication studies.

TABLE 1 SUMMARY STATISTICS

Age		%
	31-40yrs	5.1
	21-30yrs	72.3
	<20yrs	22.6
Total	100.0	
Gender	Male	53.9
	Female	46.1
Total	100.0	
Faculties	Engineering	25.7
	Science	19.8
	Management studies	29.7
	Environmental studies	13.3
	Business Communication studies	11.5
	Total	100.0

A. Awareness on computer ethics and security

An independent sample T-test was conducted to examine the level of computer ethics and security awareness among the female and male students of the two institutions surveyed in this study. Results in Table 2 show that significance differences exist ($t = 3.335$, $p < 0.05$) in awareness on computer ethics between male and female students. Male students with a mean value score of about 2.6 tended to be more aware on computer ethics than their female counterparts. In view of this result, it could be said that gender has some influence on computer ethics awareness among tertiary institution students in Nigeria. This finding corroborates earlier studies. For example, in their study on gender response on ethical use of software's not paid for despite the licensing agreement, Lori and Cronan [22] reported that more males (64) believed it is acceptable to use a program without paying the usage fees compared to 32 females who believed so. McCarthy et al. [23] surveyed undergraduate and graduate Computer Information Systems (CIS) students in the USA and found that significant differences existed between male and female CIS students in their ethical beliefs regarding information technology usage. In contrast, Masrom and Ismail [18] and Acilar and Yoruk [24] all reported that females were more aware of computer ethics than their male counterparts. The implication of the findings of the study is that universities and other training institutions should put into consideration the different ethical perceptions of male and female students in the preparation of university/corporate ethical policies and organization of workshops. In terms of computer security awareness results (Table 2) show that no significant difference exists ($t = 1.543$, $p > 0.05$) between male and female respondents. What this suggests therefore, is that gender of respondents does not influence their awareness of computer security. The findings of this study concur with that of Aloul [25] who reported that no significant differences exist between male and female on computer security behaviour.

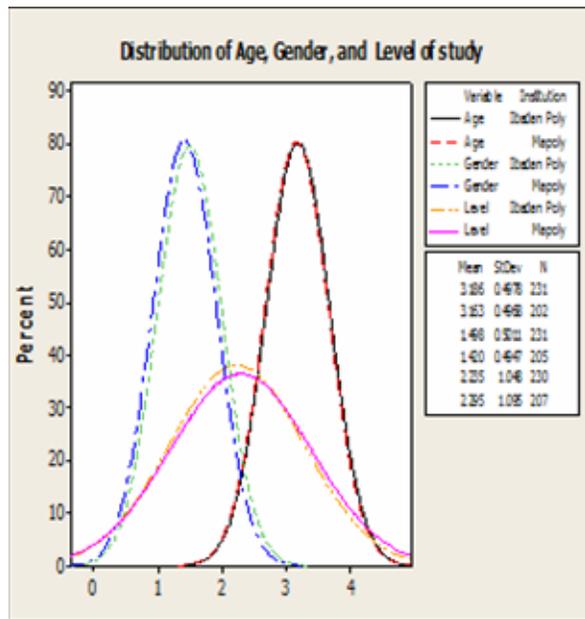


Figure 1 Distribution of demographic attributes

TABLE 2 COMPUTER ETHICS AND SECURITY AWARENESS AMONG THE GENDER GROUPS

		Independent Samples Test (t-test for Equality of Means)			
Awareness on computer ethics	Gender	Mean	Std. Deviation	t	Sig
		Male	2.6327	.95792	3.335
	Female	2.3006	.98103		
Awareness on computer security				1.543	.124
		Male	4.0410		
	Female	3.9400	.65091		

Looking at the influence of other demographic characteristics (age, number of hours spent on computer) have on computer ethics and security awareness, One Way Analysis of Variance (ANOVA) test was conducted . The results in Table 3 show that significant differences exist in the level of computer ethics awareness (F= 2.637, p< 0.05) among the different age groups. With a mean score of 3.0, respondents within the age bracket of 31-40 tended to be uncertain on computer ethics while the other age categories had mean score less than 2.5 which is an indication that their level of computer ethics is low. This result lends support to that of Masrom et al. [6] who in their study reported that older computer science students are more aware of computer ethics than younger computer science students. According to the authors, awareness of computer ethics by older computer science students was facilitated by knowledge they have acquired in some courses they have taken. Agbedejobi, [26] noted that without taking courses in ethics, students are not predisposed to ethics awareness. On the other hand, no significant difference exist on their level of computer security awareness (F = 1.106, p >0.05). Thus, it could be said that age of the respondents in this study did not significantly influence level of computer security. Although no significant difference was recorded at 0.5 level of significance, it could be seen from the mean scores in the table that male students scored a little higher than their female counterparts.

TABLE 3 COMPUTER ETHICS AND SECURITY AWARENESS AMONG THE DIFFERENT AGE GROUPS

		One Way ANOVA				
Computer ethics awareness	Age	Mean	Std. Deviation	Std. Error	F	Sig
	Computer ethics awareness	31-40yrs	3.0000	1.16569	.27475	2.637
21-30yrs		2.4741	.95746	.05742		
<20yrs		2.4267	1.02354	.11037		
	Total	2.4882	.98702	.05050		
Computer security awareness	31-40yrs	3.8952	.70886	.15468	1.106	.332
	21-30yrs	4.0303	.65266	.03787		
	<20yrs	3.9286	.72666	.07340		
	Total	3.9995	.67371	.03303		

The effect number of hours spent on computer has on computer ethics and security awareness was examined in this section. Results (Fig 2) show that differences exist in the mean score obtained for different time ranges. The respondents that spent between 21-30 hours weekly on computer recorded highest (2.90) in terms of level of awareness on computer ethics while those that spent between 1-10 hours recorded the least mean score (2.48). What this suggests is that the number of hours spent weekly on computer by students is likely to influence their ethical awareness level.

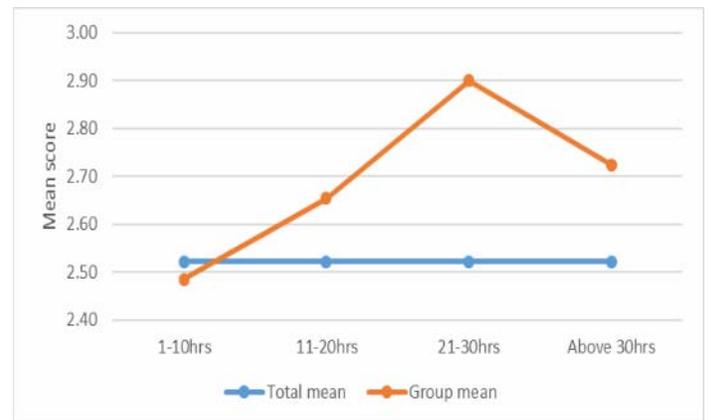


Figure 2 Awareness on computer ethics

Similarly, for computer security awareness (Fig 3), increase in number of hours spent on computer weekly tends to increase the level of computer security awareness of the students. As shown by the results, those respondents that spent 30 or more hours weekly on computer seem to have higher mean score, which could be translated as higher level of computer security awareness.

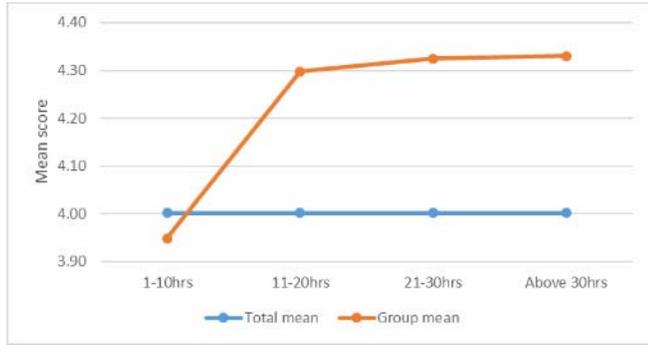


Fig 3 Awareness on computer security

Whether or not the level of study has any influence on computer ethics and security awareness was examined in the study. One way ANOVA test was conducted to see whether the various groups (level of study) differed or not in their view on computer ethics and security. Results (Table 4) show that at 0.05 level of significance, no significant difference was recorded between the groups on both computer ethics and security awareness ($F = 0.538, p > 0.05, F = 0.836, p > 0.05$). Which this suggests therefore, is that level of study does not necessarily have much influence on awareness level of the students on computer ethics and security. Based on the mean score (Table 4), level of security awareness among students from all levels as shown by the results is high. It ranged between 3.9 to 4.0. In contrast, a low mean score ranging between 2.4 to 2.5 was recorded on computer ethics awareness among all levels. However, previous study (Masrom and Ismail 2008) had reported that more educated students were more concerned about ethical issues. In our study, though not significance at 0.5% , it could be seen that those in higher levels (ND2, HND1, HND2) recorded a little higher than ND1 in their mean scores (Table 4).

Table 4 COMPUTER ETHICS AND SECURITY AWARENESS AMONG THE DIFFERENT LEVEL OF STUDY

		One Way ANOVA				
security	Level of study	Mean	Std. Deviation	Std. Error	F	Sig
	Computer awareness	ND1	3.9426	.69662	.05973	.538
ND2		4.0102	.66635	.06731		
HND1		4.0468	.69334	.06226		
HND2		4.0097	.59333	.07535		
ethics	ND1	2.4662	.93415	.08193	.285	.836
	ND2	2.5626	1.07669	.11287		
	HND1	2.5128	.99080	.09490		
	HND2	2.4250	.94489	.12627		

V. CONCLUSION

The increasing rate of cybercrimes has necessitated the need to address ethical and security issues relating to the use of computer. As earlier stated, educational institutions make use of cyberspace in conducting their research, storage of data and other activities. Thus, students and staff make use of cyberspace on daily basis. However, not much is said on how to protect the users and also those things that could be termed unethical behaviour while using the cyberspace. This study has been able to examine the level of awareness of tertiary institution students in Nigeria on computer security and ethics. It is noteworthy to say that, based on mean score of 2.6 obtained for male students and 2.3 for female on computer ethics, their awareness level could be adjudged to be low since the rating was based on a 5 point Likert Scale. Most of the students do not know some of the ethical issues guiding the use of computer or cyberspace. However, there seems to be higher level of security awareness among the students on computer use. This is reflected in high mean scores of > 4.0 obtained. This is not surprising because when it comes to security issues, people tend to pay more attention because of fear of losing their material items. Since the youths in Nigeria have been identified as the major culprits in cybercrimes, especially those in tertiary institutions, there is need therefore to enlighten them on some ethical issues regarding the use of computer. They should be made to understand that engaging in unethical issues undermines their integrity and that of the society. In view of this, Cohen and Cornwell [27] and Jamil et al. [28] have all suggested integration of computer ethics as a topic in the teaching curricula of schools in order to promote their level of awareness on IT.

REFERENCES

- [1] Stamellos, G (2007) .Computer Ethics: a global perspective http://books.google.com.ng/books?id=d9pvVxbmhYC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false.15th February 2013
- [2] Odior, E. S, and Banuso, B. F (2012). “Cashless banking in Nigeria: challenges, benefits and policy implications”, *European Scientific Journal*, vol. 8, No. 12, June, pp 289 – 316
- [3] Parsons,K., McCormac,A., Butavicius.,M and Ferguson, L. (2010). *Human Factors and Information Security: Individual, Culture and Security Environment*. <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA535944> 4th July, 2013.
- [4] Nissenbaum, H. (2005). Where computer security meets national security. *Ethics and Information Technology* 7, 61–73.
- [5] Fortinet, (2009). Fighting Cybercrime: Technical, Juridical and Ethical Challenges Virus Bulletin Conference.
- [6] Masrom M.,Ismail Z and Hussein,R. (2008 Awareness to computer ethics: A comparative study of two Malaysian higher Education Institutions . http://www.penerbit.utm.my/bookchapterdoc/KST/bookchapter_kst3.pdf.1 5th February 2013
- [7] Shaw, R. S, Chen, C.C, Harris,A.L, and Huan,H. (2009). The impact of information richness on information security awareness training effectiveness. *Computer & Education*. (52)1 92-100.
- [8] Fieser. J.(2010). *Ethics, Internet Encyclopedia of Philosophy*. (Internet) www.iep.utm.edu/ethics 13th April 2013.
- [9] Odapu, S. M. (2008). Nigeria: Cyber Crime- Time to stop Country’s Dominance, *Daily Trust*, Sept. 6
- [10] Longe, O. B., & Chiemekwe, S.C. (2008). Cybercrime and Criminality in Nigeria – What Roles are Internet Access Points Playing? *European Journal of Social Sciences*, 6(4), 132- 139
- [11] Balogun, V.F, and Obe, O. O. (2010). E-Crime in Nigeria: Trends, Tricks, and Treatment. *The Pacific Journal of Science and Technology*. 1(11). http://www.akamaiuniversity.us/PJST11_1_343.pdf 4th March 2013
- [12] Ojedokun, U.A and Eraye, M.C. (2012). Socioeconomic Lifestyles of the Yahoo-Boys: A Study of Perceptions of University Students in Nigeria. *International Journal of Cyber Criminology*. <http://www.cybercrimejournal.com/Ojedokun&Eraye2012julyjcc.pdf> 18th April 2013
- [13] Aliyu. M, Abdallah, N.O.A, Lasisi N.A, Diyar,D and Zeki,A.M.(2010). Computer Security and Ethics awareness among IUM Students: An Empirical Study. Dept of Information Systems, Faculty of Information & Technolo{JI, International Islamic University Malaysia.15th February 2013.
- [14] Aghatise, E. J. (2006). *Cybercrime definition. Computer Research Centre*. (Internet) <http://www.crime-research.org/articles/joseph06/2> 15th March 2013
- [15] Tade, O., and Aliyu, A. (2011). Social Organization of Internet Fraud among University Undergraduates in Nigeria. *International Journal of Cyber Criminology*, 5(2), 860-875.
- [16] North, M.N., George, R. and North, S. M. (2006). Computer Security and Ethics Awareness in University Environments: A Challenge for Management of Information Systems, *ACM SE’06*, 434-439.
- [17] Rezgui,Y and Marks, A. (2008). Information security awareness in higher education: An exploratory study, *Computers and Security*, 27 (7-8), pp. 241-253.
- [18] Masrom, M., and Ismail Z. (2008). Computer Security and Computer Ethics Awareness: A Component of Management Information System, Proceedings of International Symposium on Information Technology. http://www.penerbit.utm.my/bookchapterdoc/KST/bookchapter_kst3.pdf.1 5th February 2013
- [19] Akbulut, Y., Uysal, Ö.; Odabaşı, H. F. and Kuzu, A. (2008), Influence of gender, program of study and PC experience on unethical computer using behaviors of Turkish undergraduate students, *Computers & Education*, 51(2), 485-492.
- [20] Beycioğlu, K. (2009). A cyberphilosophical issue in education: Unethical computer using behavior – The case of prospective teachers, *Computers & Education*, 53(2), 201-208.
- [21] Rosenberg, R. (1997). Social impact of computers. London: Academic Press.
- [22] Lori, L and Cronan, T. (2005). *Attitude Toward Ethical Behavior in Computer Use: A Shifting Model*. Industrial Management + Data Systems
- [23] McCarthy, R. V., L. Halavi, and Aronson, J. E. (2005). Information technology ethics: A research framework, *Issues in Information Systems* (2)64-69. 15th February 2013.
- [24] Acilar, A and Yörük,D (2010).*Gender Differences in Computer Ethics among Business AdministrationStudents*. Economics and Applied Informatics. (Internet) http://www.ann.ugal.ro/eco/Doc2010_2/Acilar_Yoruk.pdf 15th February 2013
- [25] Aloul, (2012). The Need for Effective Information Security Awareness. *Journal Of Advances In Information Technology*, Vol. 3, No. 3, 172-183. (Internet) <http://infonomics-society.org/IJICR/The%20Need%20for%20Effective%20Information%20Security%20Awareness.pdf> 3rd July 2013.
- [26] Agbedejobi.,O. (2011). *Assessment of awareness about information ethics in the University of Ibadan*. (Masters Thesis) Africa Regional Centre for Information Science, University of Ibadan
- [27] Cohen, E., and Cornwell, L. (1989). College students believe piracy is acceptable. *CIS Educator Forum*, 1(3), 2-5.
- [28] Jamil,M.; Shah,J.; Tariq, R. (2013).IT Ethics: Undergraduates’ Perception Based on their Awareness. *Journal of Education & Practice*, Vol.4, NO.12