Journal of Engineering and Applied Sciences 14 (Special Issue 4): 7346-7355, 2019
ISSN: 1816-949X

Practitioners' Perception of Technology Competency Module for Training Secondary School Leavers in Maintenance of Mobile Communication Technologies for Agribusiness Occupations to Minimize Wastage

Francis Madueke Onu, Jimoh Bakare, Florence Obiagali Ifeanyieze, Mgbenka Regina Nneama, Fredrick C. Onah, Clara Ukamaka Nwankwo, Felicia Ezebuiro, Eze Godwin Emeka, George Nwachukwu Ogbonna, Lilian U. Ekenta, Omeje Benedicta Anene and Edward Isiwu
Faculty of Vocational and Technical Education, University of Nigeria, Nsukka, PMB 410001, Enugu State, Nigeria, jimoh.bakare@unn.edu.ng, +23439306264

Abstract: This study is focused on practitioners' perception of technology competency module for training secondary school leavers in the maintenance of mobile communication technologies for agribusiness occupations to minimize wastage in a depressed economy. Three research questions guided the study while the null hypothesis formulated were tested at 0.05 level of significance. The study adopted a descriptive survey and functions of industry designs. It was carried out in Enugu State and the population for the study was 126 made up of 13 lecturers of computer education, 45 electrical/electronic technology and 68 computer and phone technicians. A 99 competency item questionnaire was used for data collection. Three experts validated the instrument. Cronbach alpha reliability method was used to determine the internal consistency of the instrument, a reliability coefficient of 0.86 was obtained for the entire items in the questionnaire. Seventy-three copies of the instrument were administered to the respondents. All the copies were retrieved and analyzed using mean and standard deviation to answer the research questions and t-test to test the hypothesis. The study found out that 65 competencies in troubleshooting faults, flashing, servicing and repairing of phones, 19 competencies in servicing and repairing of computers and 15 competencies in servicing and repairing of internet facilities were required by secondary school leavers for success in e-Waste management in agribusiness. Recommendations include that the findings of this study be utilized by skill acquisition centres to train secondary school leavers for employment in the maintenance of cell phones, computer and internet.

Key words: Technology, practitioner's perception, repair, youths, school leavers, agric-business, occupation, module

INTRODUCTION

Developing nations in the African continent are currently characterized by unceasing security threats, abnormal large increase in unemployment of youths, poverty among people, falls in the availability of credits to pursue legal businesses, high volatile relative currency value fluctuations, shrinking production outputs, large numbers of bankruptcies and lack of social amenities such as constant electricity, drinkable water supply, good road networks, good health facilities and functional educational systems. All these make lives difficult for people in Nigeria which is one of the African countries. Percentage of youths without jobs is far greater than those working. Most of college or school's leavers (youths) are not skilled or employable as a result of the poor educational system went through. Thus, the potentials of these youths could be tapped through extensive training in mobile communication technologies maintenance.

Youths are active and flexible individuals in the society. They are young, energetic and flexible in minds. Youths, according to Anonymous (2018) are those persons between the ages of 15 and 24 years whose age range may go up to 30 years in some developing countries like Nigeria. Youths in the view of Sowande and Olaitan, (2000) are the most vulnerable individuals in the society, especially, in terms of means of livelihood. Olaitan *et al.* (2000) listed some characteristics of youths that could be exploited for skill acquisition to include having less fear of failure, stronger and generally healthier than the aged, less conservative and ready to welcome innovation faster than adults having sound memory and very conscious of their personal, occupational and community development.

Corresponding Author: Jimoh Bakare, Faculty of Vocational and Technical Education, University of Nigeria, Nsukka, PMB 410001, Enugu State, Nigeria, jimoh.bakare@unn.edu.ng, +23439306264

They also have flexible minds and most of them act before they think. Secondary school leavers, therefore, belong to this group because their ages fall within this age bracket of 15 and 24. John (2018) described secondary school leavers as young people who have just left school because they have completed their time there. This group of people has a tendency of committing crimes most, especially, when they are idle and have no skills or other resources for survival. Fanimo and Okere (2009) stated that idled school leavers or youths are readily available for anti-social criminal activities that undermine the stability of society. Generally, unemployed and underemployed or idled secondary school leavers are more exposed to conflicts and illegal activities as many of them fall prey to armed and rebel conflicts. Secondary school leavers are still young, strong and energetic to perform both physical and mental activities (Ogbuanya *et al*., 2016). Potentials of these secondary school leavers, therefore can be tapped through training in maintenance of mobile communication technologies frequently used for agribusiness.

Agribusiness comprises all buying and selling activities of agricultural inputs and outputs. Anonymous (2001) defined agribusiness as a generic term for the various businesses involved in food production including farming, seed supply, agric-chemicals, farm machinery wholesale and distribution, processing, marketing and retail sales. Nwibo explained agribusiness as the sum of all operations involved in the manufacturing and distribution of farm commodities and items made from them. Olaitan *et al.* simplified agribusiness as the sum of all the economic activities involved in distribution, marketing and supplying of farm inputs to the farmers and farm outputs to the target consumers. Nwankwo *et al.* emphasized that modern day businesses are conducted and facilitated through the use of Mobile Communication Technologies (MCT) such as telephones, fax machines computers and communication networks through the internet. Darby (2004) stated that mobile communication technologies are those devices which depend upon the broader phenomenon of Internet Protocol (IP) convergence when data, voice and video travel over a single channel. Bakare (2014) stated that MCT has the capability of receiving, processing, transmitting data, voice and video signals through a wireless link. This phenomenon, the researcher clarified has given birth to the contemporary e-Commerce, e-Government, e-Medicine, e-Banking, e-Education among others. Gazette explained that the e stands for electronics in today's technology language. In the area of the study, most of the MCTs used to facilitate agribusiness include, smart and low ends cell phones, Personal Digital Assistant (PDA), telephone, ipads, computers and internet. These mobile communication technologies become e-Waste when they are considered out of use in agribusiness due to malfunctioning.

e-Waste simply means discarded electronic or electronic products such as computers, radio, cell phone, office electronic equipment, refrigerator among others. e-Waste according to Kozlan (2010) is all electronic equipment or products with power plug, batteries which have become obsolete due to, advancement in technology, changes in fashion, style and status and nearing the end of their useful life. Electronic waste or e-Waste is a term for electronic products that have become unwanted, non-working or obsolete and have essentially reached the end of their useful life (ERC., 2011). The researcher maintained that e-Waste encompasses a growing range of obsolete electronic devices such as computer, savers, mainframes, monitors, televisions and display devices, telecommunication devices such as cellular phones and pagers, calculators, audio and video devices, printers, scanners and so on.

EPA (2007), therefore, reported that about 50 million tones of e-Waste are produced every year, especially, from developing countries. The agency estimated that between 2006 and 2007, only 15-20% of e-Waste is recycled and the rest goes directly into landfills and incinerators. Morgan (2006) while describing e-Waste as loosely discarded surplus, obsolete or broken electrical or electronic devices, stressed that it causes serious health and pollution problems, if not well-managed. Most electronics that are improperly thrown away according to ERC (2011) contain some form of harmful materials such as beryllium, cadmium, mercury andlead. These materials might be trace elements but when added up in volume become a significant threat to the environment. Besides adding harmful elements to the environment, improper disposal of e-Waste is a recycling opportunity lost. Bakare (2014) stated that electronic waste can cause health problems such as cancer to people most, especially where they are disposed carelessly. Some electronic scrap components contain contaminants such as lead, cadmium, beryllium, mercury and brominated flame retardants that can injure individuals. The researcher cautioned that recycling and disposal of e-Waste as a means of management may involve significant risks to workers and communities. Chea (2007) stated that, due to the lack of government legislation on e-Waste management, standards for disposal, proper mechanism for handling these toxic hi-tech products, mostly end up in landfills or partly recycled in unhygienic conditions and partly thrown into waste streams. Secondary school leavers who have

not gotten admission into tertiary institutions in a developing nation like Nigeria could be trained on how to maintain mobile communication technologies mostly used for agric-business.

e-Waste management, in this study, involves all effort being made to elongate the life span of electronic machines through maintenance such as troubleshooting servicing and repairs to make the e-Machines functional for reuse in agribusiness. Gazette suggested that individual or companies should consider reusing electronic devices before throwing them out or recycling them. The researcher advised that if the product still functions one should consider passing it on to friends or family or donating them to charity or second-hand stores. Gazette criticized recycling and burning as the easiest means of e-Waste management. Electronic devices should be maintained, serviced and repaired to increase their life cycle. It should be given to friends, families or returned to the manufacturers through their customers. In the area of the study, data for e-Waste produced yearly is not available and there is no electronic company available to recycle the e-Waste. The commonest way of e-Waste management as observed by the researchers is disposing of unusable electronic devices such as computer and cell phones by burning or keeping them in the house for decorative purposes. Gazette stated that manufacturing companies such as Sony Erickson, Sony Panasonic, Motorola, Nokia, LG and Samsung have certified that maintenance, servicing and repairing of e-Devices for reuse remain the best e-Waste management and e-Waste management through maintenance, servicing and repair could be engaged in by secondary school leavers, if they are equipped with technological skills or competencies.

Secondary school leavers, in the context of this study are those individuals who have completed 6 years of secondary school education but could not secure admission into any higher institutions or employed in any job. Olaitan *et al.* (2008) observed that unemployed secondary school leavers have no means of survival except by depending on their parents. This indicates that they need to be employed to reduce poverty. e-Waste management in agribusiness could provide good employment opportunities for this class of graduates, if they possess the technological competencies in troubleshooting faults, maintenance, servicing and repairing of e-Waste.

Technology, according to Waziri is the use of the product of creativity, inventions and scientific research in the service of man. Miller *et al.* (2011) described technology as the process by which humans modify nature to meet their needs and wants. Technology in the submission of Quick (1995) involves new machines (electrical and electronics), equipment and ways of doing things that are based on modern knowledge about science and computers. Someone must be competent in doing things that benefit the society. Competency in the statement of Olaitan and Ali (1997) is the successful performance of a task through the use of knowledge, skills, attitudes and judgment. Technology competencies, therefore, involve the knowledge, skills and attitudes required by secondary school leavers for troubleshooting faults, maintenance or servicing and repairing of e-Waste for reuse and reduction of environmental pollution in the area of the study. The secondary school leavers could acquire technology competencies through training module in e-Waste management.

Training is the activity of acquiring skills. Training as explained by Onuka (2008) is a skill acquisition process through which learners are taught new knowledge and skills and how to apply them. Salvi said that training can be offered as skill development for individuals and groups. Nick described training as the acquisition of knowledge, skills and competencies as a result of the teaching of vocational or practical skills and knowledge that relate to specific useful competencies. Generally, it reflects changes in the profession rather than an upward movement in the same field. Training involves presentation and learning of contents as a means for enhancing skill development and improving workplace behaviour. The researcher further stated that the objective of training individuals in an occupation such as e-Waste management is to assist them to acquire professional skills for establishing and/or improving their business. Training packages in an occupation are better organized in modules. A module, in the view of Olaitan and Ali (1997) is a unit of standard measurement. It is a segment of an instructional programme. Training modules, therefore, refer to segments of skill acquisition through which learners are exposed to the competencies in e-Waste management for easy learning and mastery by the learners. If secondary school leavers are exposed to the technology competency training modules in e-Waste management it could provide them with self or paid employment in mobile communication technologies which are related to agribusiness. Teachers of computer education could help in training secondary school leavers in the maintenance of mobile communication technologies to create jobs and to avoid environmental problems as a result of e-Waste. Teachers of computer education, therefore are those individuals professionally trained to equip students with knowledge and skills in computer programmes such as computer operations, programming, internet servicing, maintenance, servicing

and repairing. A technician in the explanation of Hornby (2006) is an individual whose job is keeping a particular type of equipment such as computer and phone in a good condition. This group of individuals may have different opinions concerning technology competencies for training secondary leavers which he addressed.

Purpose of the study: The general purpose of the study was to determine the technology competency modules for training secondary school leavers in the maintenance of mobile communication technologies for agribusiness occupations to minimize wastage. Specifically, the study sought to identify competencies needed by secondary school leavers in troubleshooting faults, maintenance, servicing and repairing of phones, computer and internet for enhancing the growth of agribusiness occupations.

Research questions: The following research questions guided the study:

- What are the competencies required by secondary school leavers in troubleshooting faults, flashing, servicing and repairing of phones to minimize e-Waste
- What are the competencies required by secondary school leavers in servicing and repairing of the computer to minimize e-Waste
- What are the competencies required by secondary school leavers in servicing and repairing of internet facilities to minimize e-Waste
- How effective is the determined technology competencies for training secondary school leavers for agribusiness occupations to minimize e-Wastage

Hypothesis: The following hypothesis were tested at 0.05 level of significance. There is no significant difference in the mean ratings of the responses of teachers of computer education and computer and phone technicians on the competencies required by secondary school leavers in maintenance, servicing and repairing of computer, internet and cell phones to minimize e-Waste.

There is no significant difference in the mean scores of secondary school leavers trained with the determined technology competencies in the maintenance of mobile communication technologies for agribusiness occupations and those trained without determined technology competencies.

MATERIALS AND METHODS

The study adopted descriptive survey research and functions of industry designs. A descriptive survey research design in the opinion of Ali (2006) is a descriptive study which uses a sample of an investigation to document, describe and explain what is in existent or nonexistent on the present status of phenomena being investigated. In a survey study, views and facts are collected through questionnaire, interviews among others, analyzed and used for answering research questions. Olaitan *et al.* (1999) described functions of industry as a design in which development of a training programme is derived from the basic functional areas of an industry or teaching operational divisions or development of an industry. The two designs were suitable for this study, since, it used a questionnaire to obtain data and develop a training module based on the functional areas of e-Waste management.

The study was carried out in Enugu State and the population for the study was 126 made up of 13 lecturers of computer education, 45 electrical/electronic technology lecturers in universities and 68 cell phone and computer technicians. The population was small and therefore, the entire population constituted the sample for the study. A structured questionnaire titled, Mobile Communication Technology Maintenance Questionnaire (MCTMQ) was used for data collection and was on 5-point Likert scale. The structured questionnaire had 99 items developed for collecting data in accordance with the research questions. The researchers visited mobile communication technology maintenance industries and technicians to identify various tasks and relevant skills and competencies and added information from the literature to it in order to make the contents of the training modules in mobile communication technologies. The instrument was organized in three sections A-C. A centred on the competencies required by secondary school leavers in installation, servicing and repairing of phones, B dealt with the competencies required by secondary school leavers in servicing and repairing of computers while C centred on competencies required by secondary school leavers in servicing and repairing of internet. Each item in the instrument was assigned a five response scale of Strongly Agree or Strongly Required (SA or SR)-5, Agree or Required (A or R)-4, Undecided (U)-3, Disagree or Not Required (D or NR)-2 and Strongly Disagree or Strongly Not Required (SD or SNR)-1point. According to Lozano *et al.* an instrument can be considered good for validity and reliability if it has between 4 and 7 alternative responses. However, fewer options are acceptable depending on the purpose and scope of the study

(Bendig, 1954; Mattell and Jacoby, 1971; Jones and Loe, 2013). The respondents were therefore, asked to rank the response options to an item based on the level at which each item was required.

The instrument was face-validated by six experts, two in the Department of Industrial Technical Education and two in the Department of Computer and Robotic Education all from University of Nigeria Nsukka while two in the phone and computer maintenance firms in Enugu and Lagos States. Their corrections and suggestions were used to produce the final copy of the questionnaire. In other to establish the internal consistency of the questionnaire items, Cronbach alpha test of internal consistency was conducted on each section in part 2 of the questionnaire. The researchers administered 20 copies of the structured questionnaire on lecturers of industrial technical education, computer and robotic education, cell phone and computer technicians in Anambra State. The reason for administering the copies of the questionnaire and other sets of respondents outside the study area was to obtain real reliability coefficient values for each section of the questionnaire. Statistical Packages for Social Sciences (SPSS) 22 Version was found useful for data analysis. The result of the reliability subjected to Cronbach alpha method revealed the following, competencies required by secondary school leavers in troubleshooting faults, flashing, servicing and repairing of phones is ($r = 0.84$, $n = 20$), competencies required by secondary school leavers in servicing and repairing of computers is ($r = 0.82$, $n = 20$), competencies required by secondary school leavers in servicing and repairing of internet is ($r = 0.81$, $n = 20$) while the overall reliability index yielded $r = 0.88$, $n = 20$. According to guidelines by Sekaran a coefficient of 0.60 is considered to be poor, 0.70 is acceptable while over 0.80 is good. Olelewe and Agomuo (2016) also stated that the closer the Cronbach's alpha is to 1, the higher the internal consistency. Based on these assertions, the structured questionnaire items, therefore were considered reliable.

Experimental procedures: Secondary school leavers were organized at a skill development centre in Enugu State. The school leavers were divided into two groups A and B. That is A for treatment class and B for control class. A pre-test prepared based on the mobile communication technology maintenance was firstly administered on the two groups of secondary school leavers before the commencement of the training. The scores of these leavers in the pre-test were kept separately. The trainers then employed the determined technology competencies in mobile communication technology maintenance to train secondary school leavers in group A for 1 week. The group B was trained based on the trainer's discretion and training note for also 1 week. Thereafter, a prepared posttest on mobile communication technology maintenance was administered on both groups of secondary school leavers and their scores were recorded. The two sets of scores obtained from posttest were compared to determine the efficacy of the training modules and if there was a significant difference in the achievement of the secondary school leavers.

Experimental conditions: Experimental bias, the following conditions were laid down to minimize experimental bias, the same lesson topics were given to a group of teachers, the same pretest and posttest were administered on every leavers at the same time to avoid experimental bias the researchers were not directly involved in the training and administration of test.

Training of trainer: A week intensive training was organized for the participating trainers by the researcher on the developed training modules.

Three research assistants were hired and briefed on how to handle the questionnaire while administering them on the respondents. Out of one hundred and 26 copies of the questionnaire administered on the respondents by the researchers, only 123 copies were duly retrieved which represent 97.61% return rate. Weighted mean and standard deviation were used to answer the research questions developed while analysis of variance was used to test the hypothesis of no significant difference at 0.05 level of significance. A cut-off point (arithmetic mean) of 3.50 was used for decision-making. Any item with a mean rating of 3.50 or above was regarded as a competency item that was required while any competency item with a mean of <3.50 was regarded as not required. Also, any item with a standard deviation of 0.00 and 1.96 indicated that the respondents were close to the mean and not too far from one another in their responses. The null hypothesis of no significant difference was accepted for any item whose $p>0.05$ but it was rejected for any item whose $p<0.05$.

RESULTS AND DISCUSSION

The results for the study were obtained from the research questions answered and hypothesis tested through data collected and analyzed. The data for answering research questions and testing hypothesis were presented in Table 1-3.

Data in Table 1 reveal that all the 65 competency items had their mean values ranged from 3.54-3.98. This

Table 1: Mean ratings and ANOVA of the responses of lecturers of computer education, electrical/electronic technology lecturers and computers and cell phone technicians on the competencies required by secondary school leavers in troubleshooting faults, flashing, servicing and repairing of cell phones to minimize e-Waste (N = 123: 13 computer teachers, 44 electrical/electronic technology lecturers & 66 computer and cell phone technicians)

Item statements/ Troubleshooting faults, M-A_1, Ability to:	$\overline{X}_T$	$\overline{X}_1$	$\overline{X}_2$	SD	p-values	Remarks
Take down the history of the faults from the cell phone user	3.91	3.68	3.81	0.99	0.34	*NS
Identify the facilities for troubleshooting faulty cell phone	3.70	3.92	3.61	0.90	0.56	*NS
Test the faulty cell phone in the presence of the owner	3.71	3.52	2.85	1.00	0.33	*NS
Recognize the symptoms of all the possible faults	3.63	3.86	2.12	0.96	0.24	*NS
List all the possible causes of the problems	3.56	3.45	3.50	0.71	0.16	*NS
Check the list of possible causes against the list of the symptoms	3.67	3.11	3.22	0.97	0.53	*NS
Rank the remaining causes in order of likelihood	3.59	3.45	3.51	0.81	0.41	*NS
Reveal the result of the troubleshooting to the owner of the cell phone	3.77	3.99	3.72	1.00	0.56	*NS
Use tested okay unit to replace a bad unit of the same capacity if the fault is obvious	3.71	3.56	3.50	0.93	0.09	*NS
Test the unit or component one by one	3.88	3.78	3.75	0.86	0.34	*NS
Record down the outcome of the troubleshooting	3.54	3.85	3.69	0.85	0.26	*NS
Tackle the likeliest causes in the order of the complexity, cost and/or time required	3.67	3.83	3.58	0.95	0.31	*NS
Flashing malfunctioned cell phones, M-A_2						
Connect the laptop to the internet	3.72	3.54	3.72	0.78	0.21	*NS
Key in the website of the service provider	3.81	3.56	3.51	0.77	0.25	*NS
Unzip the downloaded flashing software	3.74	3.99	3.74	0.86	0.53	*NS
Download correct software from the website of the service provider	3.69	3.56	3.59	1.00	0.41	*NS
Register with the CDMA or GSM carrier in your cell phone	3.65	3.78	3.55	0.93	0.56	*NS
Connect the cell phone to the computer with the help of appropriate USB cable	3.68	3.56	3.76	0.76	0.09	*NS
Install the downloaded software onto the phone	3.65	3.53	3.27	0.75	0.34	*NS
Complete the installation within 15-20 min	3.60	3.46	3.45	0.69	0.26	*NS
Servicing, M-A_3						
Disengage phone into parts	3.72	3.19	3.43	0.59	0.34	*NS
Dispense dust from the disengaged parts	3.62	3.20	3.40	0.50	0.21	*NS
Clean the motherboard with methylated spirit and dry	3.71	3.59	2.92	0.79	0.25	*NS
Couple the parts and test for functionality	3.98	3.09	3.78	0.77	0.53	*NS
Put the phone in a waterpro of leather bag	3.72	3.99	3.72	0.80	0.41	*NS
Charge the battery when down or replace, if weak	3.59	3.56	3.51	0.83	0.56	*NS
Clean dust from phone regularly	3.74	3.78	3.74	0.92	0.09	*NS
Unplug the phone from the power supply when fully charged	3.79	3.85	3.59	0.99	0.34	*NS
Service cell phone with earpiece problem	3.75	3.83	3.55	0.97	0.26	*NS
Check cell phone with mouthpiece not working	3.68	3.90	3.68	0.75	0.31	*NS
Carry out a minor repair on a cell phone with a ringing problem	3.65	3.63	3.65	0.95	0.34	*NS
Make a minor repair to a cell phone with charging problem	3.60	3.63	3.60	0.83	0.21	*NS
Heat the cell phones with vibration problems	3.82	3.58	3.58	0.83	0.25	*NS
Heat service dead cell phone	3.79	3.40	3.79	0.90	0.53	*NS
Dry clean a cell phone with a screen problem	3.72	3.29	3.72	0.81	0.41	*NS
Clean a cell phone with keypad problem	3.61	3.56	3.51	0.83	0.56	*NS
Clean the ports of a cell phone with SIM card and SIM card port problems	3.74	3.58	3.62	0.92	0.53	*NS
Service cell phone with a network problem	3.59	3.35	3.59	0.79	0.41	*NS
Adjust cell phone with hand free mode problem	3.75	3.53	3.55	0.79	0.56	*NS
Set a cell phone hanging when snapping/video recording	3.68	3.40	3.68	0.72	0.09	*NS
Adjust cell phone restarting when the memory card is inserted	3.65	3.53	3.65	0.85	0.34	*NS
Service cell phone hanging due to overloading of application software	3.60	3.55	3.60	0.80	0.56	*NS
Make a minor repair to a cell phone with charging problem	3.58	3.38	3.58	0.83	0.33	*NS
Dry clean wet cell phone with appropriate materials	3.79	3.50	3.79	0.91	0.24	*NS
Repairing, M-A_4						
Connect the phone to the power supply and switch on	3.93	3.36	3.39	0.86	0.53	*NS
Troubleshoot to identify a fault	3.73	3.19	3.65	0.84	0.41	*NS
Couple the parts back and test for functionality	3.70	3.19	3.66	0.75	0.56	*NS
Dismantle the cell phones	3.67	3.27	3.56	0.78	0.09	
Split out the casing of the cell phone	3.73	3.94	3.68	0.90	0.34	*NS
Separate the keypad from the mechanism	3.69	3.56	3.56	0.78	0.26	
Move the slider down	3.67	3.45	3.67	0.73	0.31	
Lift the connector up to unplug the screen that is attached to the circuit ribbon	3.95	3.06	3.40	0.70	0.34	*NS
Move the slider up in case of a slide phone	3.66	3.99	3.72	0.80	0.21	*NS
Remove the front cover of the cell phone	3.72	3.56	3.51	0.83	0.25	*NS
Identify faulty area or components in a cell phone	3.65	3.78	3.74	0.92	0.53	*NS
Test the components with appropriate testing instruments	3.61	3.85	3.59	0.99	0.41	*NS
Remove the component's from the motherboard using appropriate tools	3.56	3.83	3.55	0.97	0.56	*NS
Select components of correct specification	3.70	3.11	3.68	0.72	0.09	*NS
Verify the condition of the components before fixing it back to the motherboard	3.75	3.63	3.65	0.95	0.34	*NS
Repair or change the faulty components if totally bad	3.79	3.63	3.60	0.83	0.26	*NS

Table 1: Continue

Item statements/ Troubleshooting faults, M-A_1, Ability to:	$\overline{X}_r$	$\overline{X}_1$	$\overline{X}_2$	SD	p-values	Remarks
Fixes back the components into the motherboard correctly	3.72	3.58	3.28	0.83	0.31	*NS
Applies soldering iron for only 3 sec if needed	3.93	3.50	3.59	0.90	0.34	*NS
Applies sufficient flux to point's being soldered	3.66	3.11	3.52	0.80	0.21	*NS
Couple back the phone	3.76	3.56	3.57	0.83	0.53	*NS
Configure the phone	3.51	3.18	3.54	0.92	0.34	*NS

M = Module; $\overline{X}_r$ = Mean required; $\overline{X}_1$ = Mean of teachers; $\overline{X}_2$ = Mean of technicians; SD = Standard Deviation; S = Significant; NS = Not Significant; * = Required; ** = Not required

Table 2: Mean Ratings and ANOVA of the responses of the lecturers of computer education, electrical/electronic technology lecturers and computer and Cell phone technicians on competencies required by secondary school leavers in maintenance, servicing and repairing of computers to minimize e-Waste (N = 123: 13 computer teachers, 44 electrical/electronic technology lecturers and 66 computer and cell phone technicians)

Item statements/ Maintenance M-B_1, Ability to:	$\overline{X}_r$	$\overline{X}_1$	$\overline{X}_2$	SD	p-values	Remarks
Switch off the computer and its accessories after use	3.91	3.26	3.40	0.80	*1.190	*NS
Install and update strong anti-virus software to protect the computer	3.59	3.11	2.97	0.89	0.390	*NS
Power computer and its accessories using a high-quality surge protector like UPS	3.94	3.72	3.63	0.90	1.250	*NS
Stabilize the current supply with an adequate voltage stabilizer	3.83	3.26	3.42	0.58	1.02	*NS
Provide adequate ventilation for the computer in operation	3.68	3.90	3.82	0.99	0.71	*NS
Dust computer units regularly	3.58	3.67	2.47	0.83	0.81	*NS
Keep the computer in a safe, dry and cool working condition	3.53	3.08	2.86	1.01	0.91	*NS
Cover computer if not in use for a long time	3.88	3.33	3.52	0.98	0.96	*NS
Servicing M-B_2						
Recharge or change the primary battery if weak	3.60	3.50	3.28	1.08	0.29	*NS
Straighten the bent pins on the keyboard pot or replace if damaged	3.56 (3.62)	3.11 (3.11)	2.99 (2.81)	0.97	0.26	*NS
Dispense dust out of the computer system with an appropriate gadget	3.81	3.26	3.42	0.58	1.02	*NS
Clean the motherboard with a brush soaked in methylated spirit or fuel	3.63	3.91	3.76	0.79	0.67	*NS
Press sockets to ensure correct tightening	3.57	3.91	3.76	0.79	0.67	*NS
Grease/oil moving parts of the computer like ejector	3.69	3.36	3.40	0.70	0.34	*NS
Repairing M-B_3						
Connect all the cables correctly	3.94	3.72	3.68	0.90	1.25	*NS
Boot the system for functionality	3.89	3.73	3.65	1.14	1.21	*NS
Trouble-shoot to identify the fault	3.69	3.98	3.98	0.81	0.85	*NS
Remove the damaged part and replace with the recommended part	3.88	3.99	3.79	0.95	1.01	*NS
Reboot the system and test for functionality	3.58	3.42	3.18	1.02	0.23	*NS

M = Module; $\overline{X}_r$ = Mean required; $\overline{X}_1$ = Mean of teachers; $\overline{X}_2$ = Mean of technicians; SD = Standard Deviation; S = Significant; NS = Not Significant; * = Required; ** = Not required

Table 3: Mean ratings and ANOVA of the responses of the lecturers of computer education, electrical/electronic technology lecturers and computer and cell phone technicians on competencies required by secondary school leavers in maintenance, servicing and repairing of internet to minimize e-Waste (N = 123: 13 computer lecturers, 44 electrical/electronic technology lecturers and 66 computer and cell phone technicians)

Item statements/ Maintenance M-B_1, Ability to:	$\overline{X}_r$	$\overline{X}_1$	$\overline{X}_2$	SD	p-values	Remarks
Load the internet with adequate number of computers that match the capacity of the saver	3.65	3.49	3.32	0.72	0.54	*NS
Supply saver with correct power voltage	3.94	3.72	3.68	0.90	0.25	*NS
Keep the saver in a safe, dry and cool working condition	3.88	3.59	3.79	0.95	0.31	*NS
Dust the saver regularly	3.56	3.98	3.78	0.81	0.85	*NS
Load credit card regularly	3.96	3.74	3.68	0.90	1.25	*NS
Servicing M-C_2						
Disconnect the saver from the power supply	3.74	3.63	3.53	0.76	0.32	*NS
Disengage the saver into parts	3.65	3.63	3.36	0.71	0.19	*NS
Dispense dust from the disengaged parts	3.58	3.42	3.58	1.02	0.23	*NS
Clean parts with methylated spirit or fuel and dry	3.69	3.89	3.86	0.98	0.70	*NS
Couple back the parts and test for functionality	3.92	3.70	3.69	0.88	1.23	*NS
Repairing M-C_3						
Connect saver to the power supply	3.57	3.66	2.36	0.82	0.40	*NS
Troubleshoot saver to identify the fault	3.59	3.16	2.84	1.00	0.19	*NS
Loosen saver into major parts	3.89	3.40	2.39	0.95	0.23	*NS
Remove faulty part's and replace with recommended part's	3.61	3.50	2.49	1.09	0.29	*NS
Couple back the parts and test for functionality	3.79	3.19	3.27	0.79	0.39	*NS

M = Module; $\overline{X}_r$ = Mean required; $\overline{X}_1$ = Mean of teachers; $\overline{X}_2$ = Mean of technicians; SD = Standard Deviation; S = Significant; NS = Not Significant; * = required; ** = Not required

shows that the mean values were above the cut-off point of 3.50 indicating that the respondents agreed that the items were competencies required by secondary school leavers in troubleshooting faults, flashing, servicing and repairing of phones. The table also shows that the standard deviation of the items ranged from 0.59-1.00, indicating that the respondents were not too far from the mean and from the opinion of one another in their responses. The table reveals that all the 65 items had their $p>0.05$ which indicated that there was no significant difference in the mean ratings of the responses of the three groups of respondents on the competencies required by secondary school leavers in troubleshooting faults, flashing, servicing and repairing of phones. Therefore, the null hypothesis of no significant difference was upheld for all the 65 items.

Table 2 reveals that all the 19 competency items had their mean values ranged from 3.53-3.94. This shows that the mean values were above the cut-off point of 3.50, indicating that the respondents agreed that the items were competencies required by secondary school leavers in maintenance, servicing and repairing of the computer. Table 2 also shows that the standard deviation of the items ranged from 0.58-1.14, indicating that the respondents were not too far from the mean and from the opinion of one another in their responses. The table reveals that all the 19 items had their $p>0.05$ at relevant degrees of freedom. This indicated that there was no significant difference in the mean ratings of the responses of the three groups of respondents on the competencies required by secondary school leavers in maintenance, servicing and repairing of the computer. Therefore, the null hypothesis of no significant difference was upheld for all the 19 items.

Table 3 reveals that all the 15 competency items had their mean values ranged from 3.56-3.96. This shows that the mean values were above the cut-off point of 3.50, indicating that the respondents agreed that the items were the competencies required by secondary school leavers in maintenance, servicing and repairing of internet. Table 3 also shows that the standard deviation of the items ranged from 0.72-1.09, indicating that the respondents were not too far from the mean and from the opinion of one another in their responses. Table reveals that all the 15 items had their $p>0.05$ at relevant degrees of freedom. This indicated that there was no significant difference in the mean ratings of the responses of the three groups of respondents on the competencies required by secondary school leavers in maintenance, servicing and repairing of internet. Therefore, the null hypothesis of no significant difference was upheld for all the 15 items.

Table 4: Mean performance of secondary school leavers on the effectiveness of technology competencies

Group	N	Pre-test $\overline{X}$	Post-test $\overline{X}$	Mean gain
Experimental	30	10.34	55.15	44.81
Control	26	10.37	25.39	15.02

The data in Table 4 shows that secondary school leavers trained with determined technology competency modules had a mean score of 10.34 in the pre-test and a mean performance score of 55.15 in the post-test making a pre-test, post-test mean gain in the experimental group to be 44.81. The secondary school leavers trained without technology competency modules had a mean performance score of 10.37 in the pre-test and a post-test mean performance score of 25.39 with a pre-test, post-test mean gain of 15.02. With this result, the secondary school leavers trained with determined technology competency modules performed better than those trained without technology competency modules. This also implies that technology competency modules developed is effective for training secondary school leavers.

The data in Table 5 show the f-calculated values for the group on secondary school leaver's performance. The f-calculated value for group is 34.439 with a significance of f at 0.000 which is <0.05. The null hypothesis is therefore, rejected at 0.05 level of significance. With this result, there was a significant difference between the performance of secondary school leavers trained with the developed technology competency modules and those who were trained without technology competency modules.

The result of the study revealed that 65 competencies in troubleshooting faults, flashing, servicing and repairing of phones, 19 competencies in servicing and repairing of computers, 15 competencies in servicing and repairing of internet facilities are required by secondary school leavers for success in e-Waste management in agribusiness. The findings of the study are in agreement with the findings of Olaitan *et al.* in a study on technology skills required for capacity building of instructors in teaching agribusiness to students in schools of agriculture in Southeastern Nigeria where it was found out that the instructors needed capacity building in skills in the application of computer and internet for effective teaching of agribusiness to their students in schools of agriculture. The findings of this study also agreed with the findings Olaitan *et al.* (2008) that lecturers required performance competencies in making use of computer for teaching, operating the computer and in applying the computer to agriculture through the internet, e-mail and Microsoft Power Point. This finding was also in agreement with the study of Akinduro (2006) who carried out a study on electrical installation and maintenance work skills needed by technical college's graduates to enhance their

Table 5: Summary of analysis of covariance for test of significance of treatments on secondary school leavers trained with technology competency modules and those trained without

Sources	Sum of squares	df	Mean square	F-values	Sig.
Corrected model	4831.358[a]	4	1207.8395	17.137	0.000
Intercept	2201.258	1	2201.258	266.043	0.000
Group	288.779	1	288.779	34.439*	0.000
Error		788.739	24	32.864	
Total	567463.000	56			
Corrected total	5050.089	55			

*Significant at sig of F<0.05; [a]Significant value

employability in Ondo State, the researcher found out that the graduates of technical colleges needed domestic installation, industrial installation, cable jointing, battery charging and winding skills in electrical machine for employment in Ondo State.

It was also found that the technology competency module was effective in training secondary school leavers in the maintenance of mobile communication technology. The finding agreed with the finding of Oke (2018) who found that RTV teachers trained with professional skill retraining programme performed better than those trained without professional skill retraining programme. Also, the finding agreed with the finding of Uzoka (2010) who carried out a study on the development of family law awareness programme for families in Anambra State and found that family law awareness programme was effective in training family members in Anambra State.

Furthermore, the results of hypothesis one, two and three showed that there were no significant differences in the mean responses of respondents in various locations on the technology competencies required by secondary school graduates in maintenance, servicing and repairing of electronic machines for agribusiness occupations to minimize wastage. This also means that the respondents in various locations had similar perceptions on each competency for maintenance of phones, computers and the internet. The findings of the above researchers in their various research activities helped to support the justification of the results of this study on the technology competencies for training secondary school leavers in the maintenance of mobile communication technologies for agribusiness occupations to minimize wastage.

CONCLUSION

Technologies such as mobile communication technologies have a crucial place in today's business and other human endeavours. For example, application of MCTs such as mobile phones, computers, PDA and internets facilitate agribusiness but people using these technologies lack capacities to maintain them for reuse and therefore, becomes e-Wastes. In order to reduce or put an end to this situation, the study was designed to determine competencies in the maintenance of cell phones, computers and internet facilities for training secondary school leavers for success in e-Waste management in agribusiness.

RECOMMENDATIONS

Based on the findings of this study the following recommendations can be considered:

- All the findings of this study be utilized by skill acquisition centres to train secondary school leavers in agribusiness on the maintenance of cell phone, computer and internet
- Resources to make these training possible should be provided by the government and enabling bodies in the society

ACKNOWLEDGEMENT

The researchers thank the Ekiti State Government, South-West Nigeria for funding this research work. The researchers appreciate the efforts and willingness of individuals who participated in this study as experts, respondents and research assistants.

REFERENCES

Akinduro, I.R., 2006. Electrical installation and maintenance work skills needed by technical colleges graduates to enhance their employability in Ondo state. M.Ed Thesis, The Department of Vocational Teacher Education, University of Nigeria, Nsukka, Nigeria.

Ali, A., 2006. Conducting Research in Education and the Social Sciences. Tashiwa Networks Ltd, Enugu, Nigeria,.

Anonymous, 2001. Agribusiness. Wikimedia Foundation, San Francisco, California, USA.

Anonymous, 2018. Learning to live together. UNESCO, Paris, France. http:// www . unesco. org/new/en/kingston / earning-to-live-together/

Bakare, J., 2014. Development and validation of cell phone maintenance training modules for national diploma students. Ph.D Thesis, University of Nigeria, Nsukka, Nigeria.

Bendig, A.W., 1954. Reliability and the number of rating-scale categories. J. Appl. Psychol., 38: 38-40.

Chea, T., 2007. America Ships Electronic Waste Overseas. Associated Press. New York..

Darby, J., 2004. eLearning as change agent. Proceedings of the International Conference on E-Learning for Knowledge-Based Society, August 4-5, 2004, Bangkok, Thailand, pp: 171-176.

EPA., 2007. E-waste in US. Environmental Protection Agency, USA.

ERC., 2011. What is E-waste. Electronix Redux Corp, Wrentham, Massachusetts. http://www.bostonelectronicwaste.com/go-green/what-is-ewaste

Fanimo, D. and R. Okere, 2009. Nigerians bemoan rate of unemployment, seek action. The Guardian, Kings Place, London.

Hornby, A.S., 2006. Oxford Learner's Dictionary of Current English. Oxford University Press, London, UK.,.

John, W.B., 2018. On being a Mentor: A Guide for Higher Education Faculty. Lawrence Erlbaum Associates, New Jersey, USA.,.

Jones, W.P. and S.A. Loe, 2013. Optimal number of questionnaire response categories: More may not be better. SAGE Open, 3: 1-10.

Kozlan, M., 2010. What is E-waste and how can I get rid of it?. Four Green Steps, Montreal, Canada.

Matell, M.S. and J. Jacoby, 1971. Is there an optimal number of alternatives for likert scale items? Study I: Reliability and validity. Educ. Psychol. Meas., 31: 657-674.

Miller, I.O., J. Bakare and R.O. Ikatule, 2011. Professional capacity building needs of teachers for effective teaching of basic technology curriculum to students in junior secondary school in Lagos State. Niger. J. Curriculum Stud., 18: 222-229.

Morgan, R., 2006. Tips and tricks for recycling old computers. Smartbiz Technologies Private Limited, Amritsar, India.

Ogbuanya, T.C., J. Bakare and M.A. Yisa, 2016. Development of appropriate contents in cell phone maintenance for youth empowerment. J. Assoc. Vocational Tech. Educ. Niger., 21: 234-246.

Oke, S., 2018. Development and validation of professional skill retraining programme for teachers of Radio, Television and electronic works in technical colleges in Lagos State. Ph.D Thesis, Department of Vocational Teacher Education, University of Nigeria, Nsukka, Nigeria.

Olaitan, S.O. and A. Ali, 1997. The Making of Curriculum: Theory, Process, Product and Evaluation. Cape Publishers International Ltd, Onitsha, Nigeria,.

Olaitan, S.O., A. Ali, E.O. Eyo and K.G. Sowande, 2000. Research Skills in Education. Pacific Publishers Ltd., Obosi, Nigeria,.

Olaitan, S.O., C.E. Nwachukwu, C.A. Igbo, G.A. Onyemachi and A.O. Ekong, 1999. Curriculum Development and Management in Vocational Technical Education. Cape Publishers International Ltd, Onitsha, Nigeria,.

Olaitan, S.O., E.C. Osinem, A.B. Hontonyon and M.A. Akeju, 2008. Performance Competencies Required by Lecturers for Application of Micro-Computers for the Teaching of Agriculture in Colleges of Education in South West, Nigeria. In: Education in the Information Age: Global Challenges and Enhancement Strategies, Nworgu, B.G. (Ed.). University Trust Publishers, Nsukka, Nigeria, pp: 172-177.

Olelewe, C.J. and E.E. Agomuo, 2016. Effects of B-learning and F2F learning environments on students achievement in QBASIC programming. Comput. Educ., 103: 76-86.

Onuka, A.U., 2008. Development of skills training modules for enhancing youth participation in regulated cassava processing occupations in Southeast, Nigeria. Ph.D Thesis, Department of Vocational Teacher Education, University of Nigeria, Nsukka, Nigeria.

Quick, L., 1995. Longman Dictionary of Contemporary English. Longman Group Ltd, Spain,.

Sowande, K.G. and S.O. Olaitan, 2000. Reducing poverty among youths through skill training in agriculture and technology at secondary school level. J. Niger. Educ. Res. Assoc., 14: 201-203.

Uzoka, F.A., 2010. Development of family law awareness programme for families in Anambra State. Ph.D Thesis, Department of Vocational Teacher Education, University of Nigeria, Nsukka, Nigeria.