

Assessment of Developed Mobile Phone Maintenance Training Module for Technical Colleges by Experts in Ebonyi State, Nigeria

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Abstract

The study on assessment of developed mobile phone maintenance training module for technical colleges was necessitated by the obvious dearth of qualified technicians to service and maintain mobile phones for the increasing number of users in Nigeria. Two research questions guided the study and two null hypotheses were tested. The survey research design was adopted for the study, and the area was Ebonyi State which is located in the South-East, Nigeria. The population of the study was 108 (14 teachers/instructors from technical colleges, 25 experts from telecommunication industries and 69 road-side technicians) from the area of study. The entire population was studied without sampling because the size was small and manageable. Instrument for data collection was a five-point rating scale questionnaire titled "Assessment of mobile phone maintenance training module questionnaire (AMPMTMQ)" containing 148 items in two clusters in line with the research questions. The instrument was validated by experts. Internal consistency method was used to establish the reliability of the instrument using Cronbach alpha and reliability coefficient values of 0.86 and 0.83 were obtained for the two sections with an overall reliability coefficient value of 0.845. Mean and standard deviation were used to answer the research questions while analysis of variance (ANOVA) was used to test the null hypotheses at 0.05 level of significance. Findings revealed that respondents agreed the objectives and considered contents of the MPMTM as required. Status of the subjects significantly influenced their mean ratings on the objectives and contents of the MPMTM. Based on the findings, it was concluded that the developed MPMTM will go a long way in helping technical college teachers and instructors produce graduates with relevant knowledge and skills to efficiently service and maintain mobile phones for the local users. It was, therefore, recommended among others that the National Board for Technical Education should incorporate the developed MPMTM into technical college curriculum while government should retrain teachers and instructors in technical colleges for its effective implementation.

Keywords: *Objective, Content, Development, Validation, Mobile technology, Mobile phone maintenance, Training module, Technical colleges.*

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Background to the Study

Mobile technology has become one of the fastest growing technologies in the world. Today people use mobile phones to stay in touch with friends and family, share stories and photographs in social media and carry out financial transactions. Douglas (2015) defined mobile phone as a handheld device that allows the user to make and receive telephone calls while moving around a wide geographical area. Mobile phones have the capability of receiving, processing and transmitting data, voice and video signals through wireless links. A mobile phone is an electronic telecommunications device with the same basic capability of a conventional fixed-line telephone but is portable and does not require to be connected with a wire to the telephone network. Javapoint (2019) explained that mobile communication is the use of technology that allows individuals to communicate with others in different locations without the use of any physical connection (wires or cables). It is a well-known fact that, generally, mobile communication makes life easier for individuals and groups as it saves time, cost and effort in achieving personal, business and other objectives.

Mobile communication gadgets or devices include hand-held audio and multimedia guide, handheld game, personal audio player and mobile or cell phones. Schacher (2009) and Open University Netherland (2009) listed mobile communication technologies to include laptop, notebook computer, smart phones, low ends cell phones, personal digital assistant (PDA), tablet personal computer (TPC) pocket personal computers (PPC) and Satellite communication. Mobile devices can enable someone to use a variety of communications technologies such as (a) global system of mobile (GSM) for communications and general pocket radio service (GPRS) data networking services for mobile phones; (b) wireless fidelity (Wi-Fi) - a type of wireless local area network technology; (c) Bluetooth - connects mobile devices wirelessly; (d) dial-up services - data networking services using modems and telephone lines and (e) virtual private networks - secure access to a private network. Java point (2019) opined that personal digital assistant is an affordable gadget which offers high end features and acts as office assistant since it can store personal and official files. The most commonly used mobile communication technologies by individuals are laptops, iPad and mobile phones. Others which are highly restricted to professionals include walky-talky and mobile tapes. However, the basic communication method of all mobile technologies is through the electromagnetic microwaves with a cell base station. Some mobile phones adopt advanced mobile phone service (AMPS) for the digital advanced mobile phone service (D-AMPS), code division multiple access (CDMA) 2000, evolution data only (EVDO), GSM, universal mobile telecommunication system (UMTS), and GPRS for the digital communication. Sarah (2009) added that each mobile phone network has a unique radio frequency. Burns and Lohenry (2019) explained that mobile phone makes use of different mobile communication methods, such as short message service (SMS), Wireless Application Protocol (WAP), Wireless Local Area Network (WLAN), WIFI, GPRS, Bluetooth, Infrared, Infra-red Data Association (IrDA) and I-Phone.

There are different types of mobile phones which are manufactured by different companies with their trademarks or brands including Apple, Samsung, Nokia, Infinix, Techno and Hauwei among others. They have some features in common, but manufacturers also try to

differentiate their products by implementing additional functions to make them more attractive to costumers. Clark (2019) asserted that features in mobile phone capabilities are beyond sending text messages and making the short or long-distance voice calls other features are internet browsing, music player, email, personal organizer, built in cameras, multimedia messaging (MMS), call registries, built in games, voice mails, video call, Bluetooth and infrared.

Common components of a mobile phone include a rechargeable lithium-ion battery to provide power source for the phone functions, input mechanism (keypad and touch screens) and display to allow the user to interact with the phone. Subscriber identification module (SIM) widely known as SIM card, is an integrated circuit that is intended to securely store the international mobile subscriber identity (IMSI) number and its related key, which are used to identify and authenticate subscribers on mobile telephony devices (such as mobile phones and computers). Douglas (2015) outlined components of mobile phones to include liquid crystal display (LCD), menu button, keypad, antenna, battery, microphone, earpiece, power switch, battery terminal, power integrated circuit, oscillator, frequency divider, central processing unit, flash chips and SIM.

Mobile phones and their components are prone to faults like hardware faults, software faults and setting faults (Douglas, 2015). Mobile phones aid daily business transaction and services with ease but can create some management problems to users in the areas of maintenance, repair and servicing (James, 2011). Many users of mobile phone hardly locate efficient technicians who can repair and service such faults thereby making them to abandon their faulty phones and purchase new ones. Where such faults are effectively repaired and the phones easily maintained, it will reduce continuous spending of money by users for replacement and electronic wastage which constitute health hazards to people where they are disposed carelessly.

There are possibilities of reversing this trend through developing phone maintenance skills in technical college students. Technical colleges have the responsibility of producing skilled and trained manpower to maintain and repair all kinds of electronics including mobile phone but the curriculum lacks contents of mobile phone maintenance. Chukwuedo (2014) traced the dearth of skilled mobile phone technicians to the relative inadequate inclusion of such skills in the curriculum of the school system as early as necessary. This may be the reason why majority of the available technicians perform maintenance and repair tasks using guess work and trial and error basis as they were never or rarely exposed to such skills while in school, consequently, they are ineffective and unable to satisfy their customers. To equip Nigerian technical college graduates with skills for maintenance and repair of damaged or malfunctioning mobile phones requires a suitable training module. Unfortunately, no such module has been developed and empirically validated for the purpose. Many people maintaining mobile phones in the Nigerian society are not formally trained, therefore, use trial and error method, causing more damage to the phone and incurring extra expenses for the user (Chukwuedo, 2014).

Findings of this study, when published will be of immense benefits to different individuals, organizations, government, researchers and the Nigerian society at large. The society will have lots of trained and qualified digital electronic technology personnel who can efficiently repair and maintain all kinds of faulty mobile phones and save the hard-earned income that would have been spent for their replacement. These trained personnel could also advice users on proper ways to handle their mobile phones to increase their efficiency and life span. Mobile communication technology industries will also benefit from the findings if implemented because there will be a pool of competent mobile phone maintenance technicians to employ for enhanced productivity.

Purpose of the Study

The main purpose of the study was to assess mobile phone maintenance training module (MPMTM) developed by the researchers. Specifically, the objectives of the study were to:

1. Assess the objectives of the developed MPMTM.
2. Assess the contents of the developed MPMTM.

Research Questions

The following research questions guided the study:

In the opinion of experts,

1. What are suitable objectives for a MPMTM?
2. To what extent are contents of the developed MPMTM required?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean ratings of technical college teachers/instructors, supervisors in telecommunication industries and road-side mobile phone service technicians on objectives of the developed MPMTM.
2. Respondents do not differ significantly in their mean on required contents of developed MPMTM.

Review of Literature

Maintenance is the process of preserving something or returning it to its original condition. It covers all actions necessary for retaining an item or restoring it to a serviceable condition such as servicing, repair, modification, overhaul, inspection and condition verification (Sajid, 2009). Maintenance is a set of measures to ensure that a given piece of equipment or infrastructure is kept in good operational condition until it attains its maximum possible life span. The practices of identifying faults in an appliance and remedying them to prolong their service life is contextually termed maintenance practices. There are basically three types of maintenance practices usually carried out in any system. These are predictive, preventive and corrective maintenance. An important maintenance practice in mobile phone necessary for self-employment by technical college graduates is the corrective maintenance. Corrective maintenance is the activity undertaken to detect, isolate and rectify a fault so that the failed equipment (faulty mobile phone, machine or system) can be restored to its normal operable state. Therefore, mobile phone maintenance includes all the activities carried out to configure, upgrade, flash (factory formatting), service and repair damaged or malfunctioning mobile phones.

Module refers to an instructional unit that focuses on a particular topic. Although the details and activities vary according to the specific context, such as course and student level, most educational modules include information about the topic, focus on student-centered learning activities and culminate in a project for students to demonstrate understanding. A training module is an instructional guide primarily used for teaching and learning step-by-step procedures. Training modules also can be used to present more factual information on given topics or areas. Help Board (2017) defined training as an arranged program intended to enhance execution and realize quantifiable changes in learning, abilities, states of mind and social conduct of workers. Training may be carried out through various approaches like on the job, classroom sessions, on site or off site, online and case studies. Training is a process of transferring basic knowledge, skills and attitudes to learners to enable them improve their performance and is used in technical colleges to equip students of electrical/electronic technology with knowledge, skills and attitudes to service, repair and maintain all kinds of mobile phones and other electronic devices with relevant tools and equipment.

Mobile phone maintenance training module (MPMTM) is conceptualized in this study as a package of information whose elements such as objectives, contents, facilities, instructional procedure and evaluation techniques and activities are arranged and organized for use in technical colleges to make the products capable of maintenance of all kinds of mobile phones. Technical colleges are institutions at the secondary level, where vocational and technical subjects are offered by students to acquire theoretical and practical skills for scientific application in order to become dexterous especially in repairs and maintenance works. Federal Republic of Nigeria (FRN, 2013) explained that technical college is the segment of education designed to produce craftsmen at low and even the advanced level. This means that graduates of technical colleges, by the virtue of their training, are expected to possess adequate skills to efficiently work in electrical/electronic and telecommunication industries or set up their own businesses and employ others in order to reduce the high level of unemployment and the associated ills in the society.

The first step in developing training modules is to conduct a needs assessment to ascertain what is currently in place and what is needed in future in order to identify competencies required in a particular field. It involves identification of training objectives, designing module contents, selecting the instructional techniques to be used to facilitate learning, facilities to be used in the training, evaluation techniques and activities for assessing the training modules. Training objectives are the expected learning outcomes. According to O'Neil (2019), training or learning objectives are the intended measurable outcomes that learners will achieve once they finish a course or programme. Training objectives provide detailed information on what will be acquired and what learners will be able to accomplish through learning this information. Importantly, training objectives should be concise, focused statements that break down what each course will accomplish and how they will help reach the overall end goal of training. Objectives of mobile phone maintenance training modules indicate what technical college students would be able to do after exposure to the module.

Content simply means the totality of what is to be taught in a programme. The content component of teaching and learning situation refers to the important facts, principles and concepts to be taught which must be in line with the learning experiences and clear cut objectives to be achieved by the end of each respective lesson (Val, 2016). Contents can be in form of knowledge, skills, attitude and values that learners are exposed to and involve subject matter based on problems, themes or topics cutting across traditional subjects. Contents of the developed MPMTM include functions of major components of mobile phones, symptoms and remedies of faults in mobile phones, safety precaution needs of cell phones, skills in trouble shooting, repairing, servicing, configuring, flashing, upgrading, coupling, unlocking and jail breaking of malfunctioned mobile phones.

Skills in servicing/repairing a faulty mobile phone are abilities to restore faulty mobile phones with minor or major faults and include the actions one must take to clean, check and adjust to ensure that it works properly (Clark, 2019). The skills include configuring, flashing, unlocking, upgrading, jail breaking and coupling. Configuration skills are the learnable tactics for arranging and interconnecting hardware and software components of a mobile phone. Oluwaseun (2009) explained that skills in flashing mobiles phones are the capacities for updating the software programme of the phone memory while Kayne (2012) posited that skills in unlocking blocked mobile phone include the step by step laid down procedure to use the phone on any telecommunication network with interchangeable SIM card. Skills in upgrading handsets, according to Larry (2013), are the abilities required to improve the quality, standard or performance of a mobile phone especially by incorporating new advances. Jail breaking skills are the procedural steps required for bypassing the locks put in place by manufacturer in order to gain access to a large number of unauthorized Apps. Skills in coupling a mobile phone are the procedural steps required to perfectly fix back parts of a mobile phone together. All these skills are usually gained through training with relevant facilities and instructional techniques.

Method

The study adopted a survey research design. According to Nworgu (2015) survey research design is the most suitable design for studies that collect data from a particular population or its representative sample in order to take a decision on their stand regarding any given situation. Survey research design was considered suitable for the study as its focus was to obtain the assessment of experts on the objectives and contents of developed mobile phone training module using structured questionnaire. The study was conducted in Ebonyi State in South-East, Nigeria which has a very high rate of unemployed graduates of technical colleges who need skills to effectively maintain and repair mobile phones and earn decent living. Population was 106 comprising teachers and instructors in all three government technical colleges (14), supervisors with telecommunication industries (MTN, Globacom, Airtel, Etisalat and Cnet (25) and literate road-side phone service technicians in the state capital (69). The population of respondents from technical colleges and telecommunication industries was obtained from their offices. The entire population was used as sample because the size was not too large and manageable.

Instrument for data collection was a structured questionnaire titled “Assessment of mobile phone maintenance training module questionnaire (AMPMTMQ)” developed by the researchers after an extensive review of literature and based on the objectives of the study. The instrument has 148 items in two clusters covering objectives (12 items) and contents (136 items) on a five-point rating scale of SA/VMR, (strongly agree/very much required) A/M¹R (agree/much required), UD/M²R (undecided/moderately required), D/LR (disagree/little required) and SD/VLR (strongly disagree/very little required). Three experts, two in technology education and one in educational measurement and evaluation from Nnamdi Azikiwe University validated the instrument. Pilot test was conducted to establish the reliability of the instrument using the internal consistency method with Cronbach alpha and reliability coefficient values of 0.86 and 0.83 were obtained for the clusters with an overall reliability coefficient value of 0.845.

The arithmetic mean and standard deviation were used to answer the research questions and determine the closeness of the respondents' mean ratings. Decision for the research questions was based on the cluster mean score in relation to a cut off mean score of 2.50. Analysis of variance (ANOVA) was used to test the null hypothesis at 0.05 level of significance. A hypothesis was rejected where the p-value was less than the alpha value ($p < 0.05$) and not rejected where the p-value was equal to or greater than the alpha value ($p > 0.05$). The statistical package for social sciences (SPSS) version 23 was used for the analysis.

Results

Table 1: Respondents' mean ratings on the objectives the MPMTM for technical colleges

S/N	Objectives of Mobile Phone Maintenance Training Module:	X	SD	Remarks
	On completion, trainees should be able to:			
1	Set up Mobile phone maintenance workshop	2.85	1.04	Agree
2	Identify different parts of mobile phones and their functions	2.94	1.08	Agree
3	Explain different symptoms of faults in mobile phones and possible ways of repairing them	2.75	0.89	Agree
4	Service any type of malfunctioned mobile phones	2.79	0.97	Agree
5	Repair different types of damaged/faulty mobile phones	2.50	1.09	Agree
6	Configure and format(flash) different models of mobile phones	2.55	0.97	Agree
7	Skillfully unlock and upgrade any type of smart phones	2.70	0.92	Agree
8	Unlock mobile phones	2.51	1.09	Agree
9	Apply jail-breaking process on smart phones	3.39	0.60	Agree
10	Apply safety precautions in mobile phone maintenance	2.73	0.95	Agree
11	Use different facilities for mobile phone maintenance	2.58	0.98	Agree
12	Identify suitable for mobile phone maintenance	2.88	1.06	Agree
	Cluster Mean	2.76		Agree

Table 1 shows that all the 12 items had mean responses above the cut off mean score of 2.5 and cluster mean score of 2.76. This means that the respondents agreed on the objectives of the developed MPMTM. The standard deviation scores ranging from 0.60–1.09 shows that the respondents were not wide apart in their ratings.

Table 2: Respondents' mean ratings on contents of the developed MPMTM required for technical colleges

S/N	Contents of mobile phone maintenance training module	X	SD	Remarks
A	Functions of the major component of mobile phones			
1	Mobile phone panel enables parts of the phone to interact with each other	2.94	1.08	Required
2	Subscriber identity module identify a mobile phone to a particular mobile network.	2.75	0.89	Required
3	Microchips provide storage for the phone's	2.77	0.97	Required
4	Signal manipulation and computation is being carried out by digital processor at high speed.	2.77	0.97	Required
5	Power management and charging of battery is done by the power section.	2.59	1.09	Required
6	Hardware are those aspect of mobile phone we can see, feel and touch	2.55	0.97	Required
7	The user interact with the mobile phone with the aid of a software	2.70	0.92	Required
B	Symptoms of major faults in mobile phones			
8	Battery not charging, Network not working, Overheating, Sound faults, Ear piece, ringer and microphone problem, Display problems, Lighting or LED problems, Touchscreen problems, Keypad problems, SIM faults, Wi-Fi problem and internet connectivity problems aresymptoms of hardware faults in mobile phones	3.39	0.59	Required
9	Software symptoms and fault in mobile phone include No signal message, Dead phone set, Phone on test mode, message delivery fault and Phone hangs, goes off, freezes or has slow processing	2.73	0.95	Required
10	Call divert, SIM lock, no connectivity, no message delivery from sender to receiver and security code country lock are symptoms of setting Fault	2.58	0.98	Required
11	Auto switch off of a mobile phone shows major components has fault or the phone is old.	2.87	1.06	Required
C	Solution to possible faults in mobile phones.			
12	Find out the cause of the faults	2.81	1.05	Required
13	Identify the faulty part or components	2.84	0.89	Required
14	Connect each symptom to fault in the mobile phone	2.82	1.11	Required
15	Know the right facilities for fixing the fault	2.68	1.03	Required
16	Recommend solutions to each faults	2.53	1.01	Required
D	Safety precautions in handling mobile phone			
17	Clean mobile phone with the right liquid such as Methylated spirit	2.82	0.98	Required
18	Wipe mobile phone with soft material	2.62	1.02	Required
19	Do not Expose mobile phone to water or foods particles	2.67	1.08	Required
20	Charge mobile phone with the appropriate charger	2.78	0.89	Required
21	Mobile phone charger should not be short circuited	2.86	0.94	Required
22	Remove the phone from the charger when it is completely charged	2.51	1.09	Required
23	Store at room temperature, avoid high or low temperature for mobile phone	2.66	1.02	Required

E	Safety precautions in maintaining mobile phones			
24	Before working on the phone, remove power source	2.81	0.98	Required
25	Remove the External memory and SIM of mobile phone before dissembling	2.89	0.93	Required
26	Use the Appropriate tool when Dissembling a mobile phone	2.71	0.95	Required
26	Use recommended tools to remove battery, SIM and Memory card of a mobile phone	3.21	0.89	Required
27	Pry gently the screw of mobile phone until they become loose on their own	2.79	1.06	Required
28	Use right tools to open a mobile phone	3.51	0.72	Required
29	Dismantle mobile phone on a clean and smooth plane	2.78	1.05	Required
30	Use appropriate tools to remove bad components from a mobile phone	3.26	0.87	Required
31	Follow the correct Procedure when soldering or DE soldering a component	2.87	0.87	Required
32	Do not repair or service a mobile phone if not conversant with the mode of operation	3.07	1.01	Required
33	Backup the software's in the mobile phone in case of smart phones	2.87	0.88	Required
34	Handle mother board/panel with care while working on a mobile phone	3.01	0.84	Required
F	Skills in diagnosing faulty mobile phones.			
	Ability to;			
35	Take note of the signs and symptoms of the faults from the user	2.97	0.81	Required
36	Establish the possible cause of the fault	2.56	1.11	Required
37	Identify the facilities for mobile phone diagnosis	2.88	1.04	Required
38	Identify the exact fault of all the possible faults	2.57	1.31	Required
39	Check the list of possible causes against the list of the symptoms	2.62	1.26	Required
40	Present the findings of the diagnosis to the owner of the mobile phone	2.53	1.20	Required
41	Use tested okay unit to replace bad unit of the same capacity if fault is obvious	2.49	1.26	Required
42	Test the unit or component one by one	2.60	0.92	Required
43	Write down the outcome of the trouble shooting	2.84	0.92	Required
44	Tackle the likeliest causes in the order of the complexity, cost and /or time required to check them	2.81	1.04	Required
G	Skills in repairing mobile phones.			
	Ability to;			
45	Dissemble the mobile phone	2.97	0.92	Required
46	Run fingernail along the edge of the cover to unclip it	2.67	0.91	Required
47	Separating the case of the mobile phone	2.83	1.05	Required
48	Remove the key pad from the frame	2.85	1.08	Required
49	Lift the connector up to disconnect the screen that is attached to the panel	2.89	0.91	Required
50	Remove the front cover of the mobile phone	2.95	1.11	Required
51	Identify faulty unit or part in a mobile phone	2.39	1.25	NR
52	Check the components with appropriate testing instruments	2.34	1.12	NR
53	Detach the component(s) from the mother board using appropriate tools	2.43	1.17	NR
54	Select component of correct specification	2.37	1.22	NR
55	Change the faulty components if it is unserviceable	2.50	0.94	Required
56	Appropriately fix back the components into mother board correctly	2.73	0.92	Required

57	Applies soldering iron if needed	2.58	1.10	Required
58	Applies sufficient flux to point(s) being soldered	3.06	0.73	Required
59	Couple the phone	2.49	0.94	Required
60	Configure the phone	2.51	0.97	Required
H	Skills in assembling a mobile phone.			
	Ability to:			
61	Gently fix the panel to the casing of the phone	2.87	1.06	Required
62	To avoid damage gently screw the panel to the casing	2.65	1.11	Required
63	Fix the microphone/speaker/mouth piece gently if removed	2.67	0.90	Required
64	Appropriately fix the screen and touchpad/keypad	2.77	1.13	Required
65	Connect the battery/SIM terminal to the appropriate position	2.58	0.91	Required
66	Insert the SIM card to rest on it terminal	2.56	0.99	Required
67	Fix the casing properly	2.66	0.97	Required
68	Configure the phone	2.86	0.94	Required
I	Skills in configuring mobile phone.			
	Ability to:			
69	Click on the menu	2.67	0.98	Required
70	Select settings	2.66	0.98	Required
71	Choose the mobile network	2.82	0.89	Required
72	Select preferred network types	3.01	1.02	Required
73	Select 2G, 3G or 4G depending on the phone capacity	2.94	0.98	Required
74	Select the network provider for dual SIM phone	2.98	0.91	Required
75	Add the name of the selected network	2.58	0.93	Required
76	Add the APN for the selected network	2.70	0.99	Required
77	Type the username and password of the selected network	3.24	0.88	Required
78	Add the proxy and port Number for feature phones	2.80	1.09	Required
79	Save the network Setting	3.38	0.84	Required
80	Reboot the phone	2.73	1.02	Required
J	Skills in flashing mobile phone.			
	Ability to:			
81	Download the compatible programme file for flashing the particular phone	3.17	0.90	Required
82	Install the programme file in the computer	2.79	0.86	Required
83	Remove or allow the battery of the phone to be flashed as required by the programme file	3.07	1.02	Required
84	Remove the SIM and memory card of the phone	2.76	0.94	Required
85	Connect the phone to the computer using the right serial box	3.01	0.85	Required
86	Detect the phone in the computer programme	2.88	0.85	Required
87	Select the flashing operation to be performed	2.52	1.11	Required
88	Remove the phone when the process is complete	2.86	1.08	Required
	<i>To flash a phone manually or to Factory reset a phone</i>			
89	Switch off the mobile phone	2.86	1.08	Required
90	Press and hold the power button and the down volume button	2.53	1.20	Required
91	Tap on setting	2.68	1.19	Required
92	Tap on Factor resetting	2.62	1.20	Required
K	Skills in unlocking mobile phone.			
	Ability to;			
93	Identify right programme file for unlocking mobile phones	2.66	0.93	Required
94	Know the phone model	2.67	1.10	Required
95	Know the IMEI of the mobile phone	2.82	0.96	Required
96	Connect the mobile phone to the computer using the right serial box	2.59	0.96	Required

96	Connect the mobile phone to the computer using the right serial box	2.59	0.96	Required
97	Contact the service providers to unlocking mobile phone	2.65	1.10	Required
98	Open the unlocking software in the computer	2.87	0.91	Required
99	Connect the computer to the internet	2.79	1.05	Required
100	Search for the phone model in the software	2.96	1.08	Required
101	Authorize software to unlock phone	2.75	0.99	Required
L.	Skills in jail breaking.			
	Ability to:			
102	Choose the correct jail breaking wizard	2.71	0.87	Required
103	Determine what version of iOS to run	2.77	0.94	Required
104	Back up the mobile phone data	3.77	0.92	Required
105	Plug the mobile phone into the computer	2.63	0.90	Required
106	Select the phone iOS and the computer operating system	2.78	0.89	Required
107	Check compatibility of the mobile phone	3.02	1.01	Required
108	Connect the mobile phone to start jail breaking process	3.16	0.68	Required
109	wait for the jail breaking process to be complete	2.79	0.91	Required
110	Reboot phone after the process	2.76	0.90	Required
111	Browse Appstore to install choice apps	3.07	0.93	Required
M.	Upgrading skills.			
	Ability to;			
112	Turn on the internet connectivity of the phone	2.75	1.03	Required
113	Know the different options in upgrading a mobile phone	2.77	0.79	Required
114	Select the exact software in the mobile phone that need upgrade	2.92	1.07	Required
115	Download the software for upgrade	2.96	0.81	Required
116	Install the software for upgrading	2.64	1.01	Required
117	Check the settings of the phone	2.79	0.87	Required
118	Reboot the phone	2.77	0.99	Required
119	Confirm functionality of the upgraded mobile phone	2.78	1.03	Required
N	Service skills. Ability to work on:			
120	Phones with faulty ear piece	2.74	0.97	Required
121	Phones having faulty mouthpiece	2.95	0.91	Required
122	Phones with ringer problem	3.11	0.83	Required
123	Phones with vibration problem	2.95	1.03	Required
124	Phone with charging point problem	2.98	0.84	Required
125	Dead mobile phone	3.00	0.92	Required
126	Mobile phone with screen problem	2.72	1.01	Required
127	Mobile phone having faulty keypad	2.81	0.88	Required
128	Mobile phone with SIM port problems	2.94	1.01	Required
129	Mobile phone with network problem	3.11	0.94	Required
130	Mobile phone with hand free mode problem	2.84	1.01	Required
131	Mobile phone hanging when snapping/video recording	3.11	0.90	Required
132	Mobile phone restarting when memory card is inserted	2.81	0.88	Required
133	Mobile phone hanging due to overloading of application software	3.04	0.97	Required
134	Mobile phone not charging	2.64	0.84	Required
135	Mobile phone that fell inside water	2.82	0.82	Required
Cluster Mean		2.87		Required

Table 2 shows that four contents had mean scores below the cut off mean score of 2.50 indicating that, in the opinion of the respondents, they are not required. The remaining 131

contents with mean scores above the cut off mean shows that they are required. The cluster mean score of 2.87 indicates that the respondents considered the contents of the MPMTM required for technical colleges. Standard deviations ranging from 0.68 to 1.31 were less than 1.96, that is 95% confidence limit. This indicates that the respondents were close to one another in their opinions and that they were not too far from the mean.

Table 3: ANOVA summary of the significant difference in respondents' mean ratings on the objectives of the MPMTM based on status

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	696.934	2	348.467	4.373	.015
Within Groups	8367.362	106	79.689		
Total	9064.296	108			

Table 3 shows that the *p*-value of 0.015 is less than the alpha level of 0.05, ($p < 0.05$). This indicates that there is significant difference in the mean ratings of teachers/instructors of electrical/electronic technology in technical colleges, supervisors in telecommunication industries and road side mobile phone technicians on the objectives of the MPMTM. The hypothesis was, therefore, rejected.

Table 4: ANOVA summary of significant difference in respondents' mean ratings on the contents of the MPMTM

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2343.217	2	1171.609	4.402	.045
Within Groups	27945.551	106	266.148		
Total	30288.769	108			

Table 4 shows that the *p*-value of 0.045 is less than the alpha level of 0.05 ($p < 0.05$). This means is significant difference exists in the mean ratings of teachers/instructors of electrical/electronic technology in technical colleges, supervisors in telecommunication industries and roadside mobile phone technicians on the contents of the MPMTM required and the hypothesis was rejected.

Discussion

Findings of the study revealed that the respondents agreed on the objectives of the developed MPMTM for technical colleges in Nigeria. The finding agrees with Orlich, Harder, Callahan, Trevison and Brown (2007) who explained that action words such as do, solve, repair, service, develop, dismantle among others are used in setting behavioural objectives for capacity building programme. The finding is also in alignment with that of Falayi (2016) who reported that 20 objectives were confirmed necessary in a MPMTM.

The finding revealed a significant difference in the mean ratings of teachers/instructors of electrical/electronic technology in technical colleges, supervisors in telecommunication industries and roadside mobile phone technicians on the objectives of the MPMTM. This

finding disagrees with that of Falayi (2016) that there was no significant difference in the mean responses of the building trade teachers and the supervisors on the 20 objectives necessary for MPMTM. The difference is believed to be between teachers/instructors in technical colleges and the untrained roadside mobile phone technicians and is expected because, even though the technicians used were literate, they still lacked knowledge of what to expect after being exposed to the training programme. However, their participation in the study has widened their horizon in the chosen trade and will motivate them to enroll in such training opportunities for enhanced performance.

Furthermore, findings of the study revealed that the respondents rated contents of the developed MPMTM as required. This finding agrees with Falayi (2016) who stated that 80 content tasks were confirmed necessary MPMTM. This finding also supports that of Chukwuedo (2014) that 29 practical skills in the repairs of mobile phone, laptop computer, DVD home theatre sound system and LCD television respectively that are highly required of electrical/electronic technology students in technical colleges. The finding also revealed that there was a significant difference in the mean ratings of technical college teachers/instructors, supervisors in telecommunication industries and road-side mobile phone technicians on contents of the MPMTM required for technical colleges. This finding disagrees with Fabiyi (2016) who reported that there was no significant difference in the mean responses of building trade teachers and supervisors on the 80 content tasks in CBTM. It also disagrees with that of Chukwuedo (2014) that there was no significant difference in the 29 practical skills in the repairs of mobile phones, laptop computer, DVD home theatre, sound system and LCD television required of electronic student's technical colleges. The difference is believed to be between teachers/instructors in technical colleges and the untrained roadside mobile phone technicians and is expected because, even though the technicians used were literate, they still lacked knowledge of what should be taught in the training programme. However, their participation in the study has widened their horizon in their chosen trade and will motivate them to enroll in such training opportunities for enhance performance.

Conclusion

Mobile phone is a gadget in telecommunication that is used in all areas of human existence. It is in virtually all human endeavours but lots of users are experiencing technical problems relative to maintenance (service and repair). Efficient technicians who can repair and service faulty mobile phones are very hard to find in the locality which makes the users struggle to purchase new ones when their phones develop faults. Based on the findings of the study, it was concluded that the MPMTM is suitable for equipping technical college students with relevant skills to solve the phenomenal problem of phone users in the society.

Recommendations

Based on the findings of the study, it was recommended that:

1. Teachers and instructors in technical colleges should use the MPMTM to adequately develop the skills of their products to effectively meet the needs of mobile phone users.
2. Administrators of technical colleges should encourage the use of the MPMTM by teachers/instructors through school/industry collaboration to procure relevant equipment and facilities.

3. National Board for Technical Education should integrate the MPMTM into the curricula of technical colleges and polytechnics in Nigeria.
4. Supervisory agencies like the National Universities Commission, National Commission for Colleges of Education and Nigerian Educational Research and Development Council should integrate the MPMTM into the curricula of technical/technology education programmes in the university, college of education (technical) and secondary school.
5. National Board for Technical Education, should sponsor further advanced research on development and validation of MPMTM for technical colleges.
6. Mobile phone and telecommunication industries should use the MPMTM in recruitment interview for enhanced performance and productivity.
7. Government should retrain teachers/instructors of electrical/electronic technology to ensure effective implementation of the MPMTM.
8. Government and related industries should donate equipment and facilities to schools for implementation of the MPMTM.

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