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Contents and Teaching Methods Required for Implementation of Employability Skills Module in the Repair and Mentenance of Smartphones for Technical College Students in Southwest, Nigeria.

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Abstract
This study focused on identifying Contents and teaching methods for implementing of employability skills module in the repair and maintenance of smartphones for technical college students.in south west, Nigeria. The study adopted the descriptive research and design of the survey type, for research and Development of the module as it described by Gall, et al., (2007) the use of research findings to design and develop new programmes and materials which assist in improving knowledge and skills. The research population was 860 which comprises technical teachers, technical instructors, road side phones technicians and industrial- station-based supervisors. A multi- stage sampling procedures was used, a sample size of 360 participants was selected, using purposive sampling techniques. Data was collected using the Implementing Employability skills Module Questionnaire (IESMQ). The reliability of the instrument was established using Cronbach Alpha method and overall coefficient of 0.96 was obtained. The usability of the module was determined through Average Variance Extracted (AVE) and Reliability was determined by composite reliability (CR) with values of 0.95 and 0.96, respectively, Confirmatory Factor Analysis (CFA) was employed in evaluating the appropriateness of identifying contents and teaching methods. The results revealed that the reliability for Contents and Teaching Methods are, 0.80, and 0.77, respectively. It was concluded that the validity, reliability and usability were appropriate for the developed module. It was also recommended that developed module in the repair and maintenance of smartphones should be properly implemented, across the technical colleges in Nigeria.

Keywords: Employability, Skills Module; Smartphones; Facilities; Technical college.

1. Introduction

Smartphones have become an essential part of life using for communication among Nigerians. According to the National Bureau of Statistics (NBS, 2023), there are over 222.5 million smartphone users in Nigeria which is the largest smartphone market in Africa. A handheld smartphone allows people to make and receive telephone calls while moving around a wide geographical area. A smartphone also supports several other functions, such as text messaging, email and internet access, photography, money transfer, and banking services among others. There are many types of smartphones available in the market. These include Ios Phone-smartphones, Gaming smartphones, Rugged smartphones, Windows smartphones, Budget smartphones, Business smartphones, Foldable smartphones, Camera-focused smartphones, Flagship smartphones, among others. Smartphones are classified based on their form and factor. Commonwealth of Learning (2015) ; Samaha., et al.(2016);Anthony, et al.(2016) stressed that form and factor refers to the size, style, and shape of a smartphone, as well as to the layout and position of the smartphone's major components. This widespread ownership and use of smartphones has created a need for professionals who can repair and service smartphones. This urgent needs calls for skilled Technicians who can repair and maintain of smartphones. Technicians are graduate of Technical Colleges.

Technical colleges are parts of the Nigeria Technical Vocational and Education Training (TVET) institutions under the supervision of the National Board for Technical Education (NBTE). The quality of academic programes in technical colleges is ensured by NBTE's curriculum development and periodic accreditation exercise. Technical colleges are designed to prepare individuals to acquire practical skills basic scientific knowledge and attitudes required as Craftsmen and Technicians at sub-professional levels. Technical colleges also provide training in several courses which include general education, Electrical/Electronic trades, automobile trade, building and woodwork trade, business trades, and computer trades (Festus, 2016). Technical colleges provide students through training with the relevant and adequate knowledge, skills, and attitude for employment under the guidelines of a teacher in related occupations. It must be noted that technical colleges play a crucial role in equipping students with the technical skills and knowledge needed in various industries. However, the traditional technical

college as observed by the researcher do not adequately prepare students for the demands of smartphone repairs and maintenance. This may be a result of lack of module to train students on the repair and maintenance of smartphones (Federal Government of Nigeria, 2022). This call for the development of employability module in the repair and maintenance of smartphones

This training module could be implemented by technical teachers, instructors, roadside smartphones technicians and industrial- based supervisors, whose capacities are built in the repair and maintenance of smartphones. Technical teachers are academic staff within the programme with minimum qualification of first degree not below second class honours lower division. Technical instructors on the other hand, assist technical teachers responsible for teaching practical skills. road side smartphone technicians are informally trained individuals maintaining all kinds of smartphones for members of the society while industrial supervisors are the experienced and high ranking smartphones distributors and electronics personnel in smartphones industries such as; TECNO, SAMSUNG, NOIKIA among others.

The development of employability skills modules in the repair and maintenance of smartphones can be influenced by several environmental factors (Hynninen & Niukko; 2021) These factors can be categorized into three main areas including; technological, economic, and social factors. According to Hynninen and Niukko, (2021), technological factors and the rapid advancement of smartphone technology play a significant role in shaping the employability skills required for repair and maintenance of smartphones. As new models and features are introduced, technical college students need to stay updated on the latest technologies and learn new skills to work with these devices. This constant evolution of technology requires individuals to be adaptable, willing to learn, and committed to ongoing professional development.

A module can be defined as a unit of curriculum based on the development of entry-level competencies of students. A module according to Festus (2016) is of equal length and will take approximately specific hours of instructional time to achieve by the average group of students. Rowe et al. (2017) said that a module lends itself to training in bits and reduce training periods. According to Olakotan (2021) a module is a self-contained, independent unit of a planned series of learning activities designed to help students accomplish certain- well-defined objectives. A module is usually presented in a booklet with each booklet produced for each class. Bakare (2020) stated that a module is an organized package of information that includes elements such as objectives, contents, assignments, or activities and assignment. Fadairo (2015);Shakoor et al. (2021) explained that in a module, the training objective, content and methodology are presented at a glance in a concise form for the use of trainers and trainees. A module is an organized unit of instruction for training of individuals (Oke, & Olakotan. 2017).

Therefore, a module was developed based on an existing model and as such, Meyer, (1988) in Olakotan, (2021), model was found relevant in the development of a smartphone repairs and maintenance module. The components of a module as enshrined in the Meyer 'model of module development comprises objectives, content, teaching methods, learning activities, facilities and evaluation techniques.

Content of the employability skills in terms of smartphones repair and maintenance can be defined as what the teacher and the students pay attention to when they are teaching and learning. Shakoor et al. (2021) described contents as a list of subjects, topics, skills, themes, concepts or work to be covered by the teacher and students. The contents of the repair and maintenance of smartphones module include; the function of major components of smartphones, replacing of damaged components, soldering jumper wire, discovering the causes of symptoms and remedies of faults in smartphones, safety precaution needs of smartphones, troubleshooting, repairing, servicing, configuring, flashing, upgrading, coupling, unlocking and jail breaking malfunctioned smartphones. Those practices are the skills that students are expected to acquire in the repair and maintenance of smartphones. Skills in the repair of devices according to Ogundola (2017) damaged are the actions required to restore something broken or damage to good working condition. Skills in repairing smartphones can be referred to ability to restore all kinds of smartphones with major faults. Skills in servicing malfunctioned smartphones are the steps or actions one must take to clean, check, adjust, and make minor repairs to a piece of a smartphone to make sure that it works properly. Skills in coupling a smartphone are the procedure steps required to fix dismantled parts of a smartphone together. All these skills usually gained through appropriate teaching methods.

Teaching methods refer to ways to be adopted by the teachers in order to pass instructions and impact the employability skills in the repair and maintenance of smartphones to the students. It will also mean the method used by the teacher to communicate effectively to the learners. Teaching methods according to Oke and Olakotan (2019) are approaches adopted by the teacher to explain the subject matter to learners which in effect enhance effective teaching. There are numerous teaching methods which may be suitable for the content of the smartphone module such as guided discovery method, lecture method, project method, field trip, demonstration and practical method, exhibition method, programmed instructional method, systematic reporting, questioning method, independent study method, meta-learning, cognitive apprenticeship instructional method, modeling method, collaborative method, role play method, buzz group method, and explanatory method among others. Thus appropriate selection of teaching methods adequately correlates with learning activities.

2. Statement of the Problem

Unemployment among Southwest Nigeria youths is increasing in daily basis. National Bureau of statistic (2023) confirmed that something reasonable must be done to the annual percentage increase in youth's unemployment which raised from 50.00% in 2021 to 55.00% in 2023. Also it appears that unemployment among Nigeria's youth was affected a large portion of graduates from technical colleges. It also appears that the traditional technical colleges' curriculum only trained students on technical skills. Because, it seems they lack of employability skills. This highlights the need for an employability skills module that will be specifically designed to address the skills gap in the smartphone service industry.

Meanwhile, government agencies and initiatives aimed at promoting employability skills, particularly in the context (terms) of smartphone repair and maintenance. Such National Vocational and Technical Education Commission (NVTNEC):

NVTNEC is a government agency responsible for overseeing Technical Vocational and Education Training (TVET) in Nigeria. It plays a crucial role in promoting employability skills by providing training programmes to technical college students. These programmes aim to equip students with the necessary skills like, assembling, dissembling, diagnosing smartphone faults, replacement of broken components, and soldering jumper wire where necessary in the printed circuit board among others.

These skills are what the majority of employers were seeking for the graduates of technical colleges who acquired such employability skills and technical skills that would make them fit for the world of work. Similarly, technical college teachers in electronics trades agreed that there are prospects in the repair and maintenance of smartphones (RMSP). But it seems, there is no module to train students along the path. All these challenges inspired the researcher to develop an employability skills module in the repair and maintenance of smartphones for technical college students in the southwest of Nigeria.

3. **Research Questions**

The following research questions guided the study:

1. What are the required contents of the employability skills module in the repair and maintenance of smartphones for Technical College students in southwest, Nigeria?
2. What are the required teaching methods for implementing the employability skills module in the repair and maintenance of smartphones for Technical College students in southwest, Nigeria?

4. Literature Review

Contents of Employability Skills Module in the Repair and Maintenance of Smartphones

Contents is defined as what the teacher and the students pay attention to when teaching and learning. Bakare, (2015) described contents as a list of subjects, topics, skills, themes, concepts or work to be covered by the teacher and his students. The contents of the module include; description of smartphones, uses of smartphones, form factors of smartphones, major parts and components of smartphones, faults encountered on smartphones, safety precaution needs during repairing smartphones, skills in troubleshooting, repairing, servicing, configuring, flashing, upgrading, coupling, unlocking and jail- breaking malfunctioned smartphones. Rabiu et al., (2016) described skills in repairing, skills as actions required to restore something broken or damaged to good condition. Skills in repairing smartphones therefore are the ability to restore all kinds of dead smartphones with major faults. Skills in servicing malfunctioned smartphones are the steps or actions one must take to clean, check, adjust, and make a minor and major repair to a smartphone according to the contents of the repair and maintenance of the smartphone established below.

The contents of the Repair and Maintenance of Smartphone module include; objectives, definition of smartphone, faults detection, repairs, hardware, software, and evaluation. Bakare (2015), and Commonwealth of Learning (2015) the contents of smartphone repair and maintenance training modules have to be organized. Therefore, the selected contents of repair and maintenance of smartphones must be in sequential order as follows:

1. Objectives of repair of a smartphone
2. Definition of a smartphones
3. Faults detection
4. Repairs of a smartphone
5. Hardware and Software of smartphone
6. Evaluation of the working condition of the smartphone after repairs.

A study carried out by Bakare (2015) on developed and validated cell phone maintenance training modules for National Diploma Student, the study answered 5 research questions and tested 5 formulated null hypotheses at a 0.05 level of significance, and the study adopted a research and development (R&D) design and was carried out in Lagos State, Nigeria. The population for the study was 137 which comprised 35 lecturers, 14 instructors of electrical/electronic. Technology, 21 supervisors and 67 Road side cell phone Technicians in Lagos State. Purposive sampling techniques were used to select 67 literate roadside cell phone technicians. A cell phone maintenance training module questionnaire was used for data collection for the study. The instrument was face-validated by three experts. Internal consistency of CMTMQ was determined using Cronbach Alpha reliability method and the overall reliability coefficient of 0.86 was obtained. Seven trained research assistants were involved in the data collection used (CMTMQ) out of 137 copies of CMTMQ administered to 35 lecturers, 14 instructors, 21 supervisors, and 67 roadside cell phone technicians only 104 copies were properly completed and returned representing a 75.91 percent return rate. Factor analysis and mean were used for answered the research questions, while analysis of variance (ANOVA) was used for tested hypotheses at a 0.05 level of significance.

The findings of the study revealed that **140 contents were required** for the development of cell phone maintenance training modules for National Diploma students. The findings of the study revealed that facilities, delivery systems, evaluation techniques, and activities were confirmed and recommended for implementing cell phone maintenance training modules.

Olakotan (2021) on developed employability skills modules in Aluminum Fabrication and Glazing Work for Technical Colleges in Nigeria. The study adopted a Research and Development (R&D) design. The population for the study was 1,181 respondents comprised 147 technical teachers, 116 technologist and 918 industrial- based supervisors in Southwest, Nigeria. Multistage sampling technique was used to select 318 participants for the study. This comprised 132 technical teachers, 96 technologists and 90 industrial- based supervisors in Southwest, Nigeria. The instrument for data collection was the Employability Skills Module in Aluminum Fabrication and Glazing Work Questionnaire (ESMAFGWQ). The instrument was validated by five experts and two specialists. The reliability of the instrument was established using Cronbach Alpha coefficient method and a coefficient of 0.95 was obtained.

The data collected on the research questions were analyzed using mean and standard deviation and Confirmatory Factor Analysis (CFA). Hypotheses 1-6 were answered using Analysis of Variance (ANOVA) and it was found that significant differences exist in the responses of technical teachers, technologists and industrial-based supervisors. The Schaeffer test for multiple comparison revealed that there were significant differences in the mean responses of technical teachers, technologists, and industrial- based supervisors. Hypothesis 7 was tested with Confirmatory Factor Analysis (CFA). The CFA was done using Analysis of Moment Structures (AMOS) software. All the hypotheses were tested at 0.05 level of significance. The findings of the study revealed that the module is structured under **required 5 contents**, Aluminum Fabrication and Glazing Work for Technical Colleges in Nigeria is valid and reliable having fulfilled all the conditions for convergent, construct and discriminant validity. Average Variance Extracted (AVE) of 0.63, 0.50, 0.52, and 0.52, 0.54 and 0.52and Composite Reliability (CR) of 0.91, 0.83, 0.87, 0.87, 0.89, and 0.86 were obtained respectively. Based on the findings of the study, it was recommended among others that the development Employability Skills Module in Aluminum Fabrication and Glazing Work should be adopted by the National Board for Technical Education and Industrial Training Fund for integration into Technical College trades in Nigeria and training youths and artisans respectively. This will enable recipients of the Aluminum fabrication and Glazing Work in Technical Colleges in Nigeria to be employable and self-reliant.

Teaching Methods for Implementation of the Employability Skills Module in the Repair and Maintenance of Smartphones.

Teaching methods simply mean implementation strategies or delivery systems, which are means of teaching prepared lessons to students. According to Mustapha et al.,(2015) delivery systems to be selected depend on the contents of the lesson to be taught by a trainer. A good teacher matches the contents of the lesson to delivery systems in order to achieve the objectives of the lesson. The application of appropriate teaching strategies improves students' understanding. It enables the students to acquire relevant skills and knowledge.

The teacher adopted teaching methods to impart instruction, skills, and knowledge to the students. On the other hand, it means a procedure used by the teacher to communicate effectively with the trainees or students. According to Festus (2016) teaching methods are adopted by the teacher to explain subject matter to learners, which the effect enhances effective teaching. Teaching according to Muhammad et al., (2017) observed that teaching procedures have gone from initiation during the early stage of educational development programs to non-traditional, and modern methods in the current educational set-up. Oke and Olakotan (2019) noted that the magnitude of development noticed in any society is dependent on the quality of the teaching procedure adopted by the teacher. Thus teachers, and institutions who adopted the best method in knowledge and skills impartation to the students remain at the forefront of development of the society.

There are various methods of teaching at teachers' disposal out of which the trainers' or teacher is expected to consider the best suitable ones for purpose of achieving desirable goals, and outcome. Udofia et al., (2012) in Olakotan (2021) submitted that avalanche of teaching methods based on expert views or perspectives, research, and experience in the educational setting. Teaching should be widely exposed to variations in different methods because some learners may respond properly to one mode and others to different modes. Ogundola, (2017) opined that teachers should adopt the constructive approach to effective, teaching and learning in academic institutions. Precisely, teaching and learning play crucial roles in the school setting, an individual cannot be done without the others this indicates that both are done simultaneously (Olakotan, 2021). Tee, et al.,(2013) in Olakotan(2021) perceived teaching as a specialized form of two-directional communication in which the learners are active and participate in any process of exposition most obviously, teaching is the communication of the skills, ideals, facts, and techniques particular to a discipline.

Teaching is the act of communicating the comprehensibility of the subject matter, demonstrating a mastery that reassures the students that they too can understand and master the consumable materials, tools, and equipment. Whatever methods the teacher and instructor utilize to implement the module, there is a common guide that needs to be used such as:

1. teaching methods are implied to achieve the outcome.
2. there is no specific best teaching method.
3. teaching methods should encourage the learner's aspiration to develop the cognitive, affective psychomotor, social, and spiritual domain of the individual.
4. in the choice of teaching practical skills, the learning styles of the students should be a major consideration.
5. in every method of teaching, learners should be able to carry along step by step.
6. every method of teaching should lead to the development of the learning outcome in three domains and flexibility should be considered in the use of teaching methods.

Methods of teaching, and practicing that are suitable for the implementation of the repair and maintenance of smartphones (RMSP) are the guided discovery method, project method, demonstration method, lecture method, field trip method, exhibition method, questioning method, explanatory method, systematic reporting method, cognitive apprenticeship

instructional method, independent study method, collaborative learning method, buzz group method, role play method among others.

In the study conducted by Festus (2016) on developed important of power metallurgy technology course of study for students in Polytechnic. The study adopted Research and Development (R & D) design. The total population for the study was 219 respondents, comprised 43 manufacturing Engineering technology lecturers, 79 managers in powder metallurgy industries, and 97 part – time students of manufacturing Engineering technology from south – south Nigeria Polytechnics. There was no sampling because the entire population for the study was used since it was of manageable size. Six research questions, and five null hypothesis guided the study. The instrument for data collection was the powder metallurgy technology course of study Questionnaire (PMTCSQ). The PMTCSQ was subjected to face validation by three experts. Cronbach Alpha Coefficient method was used to establish the reliability coefficient 0.84 was obtained. The six stated research questions were analyzed using mean, and standard deviation; while ANOVA and t-test were used to test the hypothesis at 0.05 level of significance. The results of the findings from the study are: A course of study on power metallurgy technology for Polytechnic students has been developed.

The study found **20 delivery methods** were appropriate and most suited for the developed programme. The developed course of study was certified valid for inclusion into the Mechanical Engineering technology manufacturing option curriculum of the Polytechnics by 10 experts drawn from the Universities and powered metallurgy related industries. Olakotan (2021) on the development of employability skills modules in Aluminum Fabrication and Glazing Work for Technical Colleges in Nigeria. The study adopted Research and Development (R&D) design. The population for the study was 1,181 respondents comprising 147 technical teachers, 116 technologists, and 918 industrial-based supervisors in Southwest, Nigeria. A multistage sampling technique was used to select 318 participants for the study. This comprised 132 technical teachers, 96 technologists, and 90 industrial-based supervisors in Southwest, Nigeria. The instrument for data collection was the Employability Skills Module in Aluminum Fabrication and Glazing Work Questionnaire (ESMAFGWQ). The instrument was validated by five experts and two specialists. The reliability of the instrument was established using the Cronbach Alpha coefficient method and a coefficient of 0.95 was obtained. The data collected on the research questions were analyzed using mean and Confirmatory Factor Analysis (CFA). Hypotheses 1-6 were answered using Analysis of Variance (ANOVA) and it was found that significant differences exist in the responses of technical teachers, technologists, and industrial-based supervisors. The Schaeffer test for multiple comparisons revealed that there were significant differences in the mean responses of technical teachers, technologists, and industrial-based supervisors. Hypothesis 7 was tested with Confirmatory Factor Analysis (CFA). The CFA was done using Analysis of Moment Structures (AMOS) software. All the hypotheses were tested at a 0.05 level of significance.

The findings of the study revealed that the module structured under required **6 teaching methods,** in Aluminum Fabrication and Glazing Work for Technical Colleges in Nigeria is valid, and reliable having fulfilled all the conditions for convergent, construct, and discriminant validity. Average Variance Extracted (AVE) of 0.63, 0.50, 0.52, and 0.52, 0.54, and 0.52, and Composite Reliability (CR) of 0.91, 0.83, 0.87, 0.87, 0.89, and 0.86 were obtained respectively. it was recommended among others that the development Employability Skills Module in Aluminum Fabrication and Glazing Work should be adopted by the National Board for Technical Education and Industrial Training Fund for integration into Technical College trades in Nigeria and training youths and artisans respectively.

5 Methodology

This study employed a descriptive research design of the survey type that involved the use of questionnaire to elicit information from the respondents. The design was considered suitable for the study since it sought the opinions of technical teachers, technical instructors, roadside phones technicians and industrial-base station supervisors and no variable was manipulated. The population for the study was 860, and were made up of four categories namely; 240 technical teachers, 210, instructors, 220 roadside technicians, and 190 industrial - based supervisors. The sample size for this study was 360 which comprises technical teachers, technical instructors, roadside phones technicians and industrial-base station supervisors, and a multistage sampling procedure was used to select the sample from the population. Stage one involved the selection of 108 respondents comprising 18 technical teachers, each from Ondo, Ekiti, Osun, Ogun, Oyo, and Lagos State. Using proportionate sampling technique. Stage two involved the selection of 84 respondents comprising of 14 technical instructors, each from Ondo, Ekiti, Osun, Ogun, Oyo, and Lagos States. Using simple random sampling technique. Stage three involved the selection of 96 respondents comprising of 16 roadside smartphone technicians, each from Ondo, Ekiti, Osun, Ogun, Oyo, and Lagos State. Using simple random sampling technique. Stage four involved the selection of 72 respondents comprising of 12 industrial- based supervisors, each from Ondo, Ekiti, Osun, Ogun, Oyo, and Lagos State, using a purposive sampling technique. Purposive sampling technique was employed because this sample had the desired criteria and consequently the researcher judgement based on the representative sample as to suit and appropriate the research purpose. A self–development instrument entitled "implement Employability Skills Module Questionnaire (IESMQ) was used for the study. The IESMQ was slated for a adapted five Likert scale and the response options are; Highly Required (HR) = 5, Required (R) = 4, Not Required (NR) = 3, Highly Not Required (HNR) = 2, Undecided (UD) = 1. The face and content validaty of the instrument was ascertained by four experts, while the reliability of the instrument was administered on the respondents with the help of six research assistants in which out of the 108 copies distributed to technical teachers, 90 copies were retrieved, 71 copies from technical instructors out of 84 copies initially distributed, and 78 copies from roadside phone technicians out of 96 earlier distributed. Out of 72 copies distributed 65 copies were retrieved. In all, 304 copies were duly returned representing 84.44% return rate. The data collected was analyzed using descriptive and inferential statistics.

The descriptive statistics of mean and standard deviation were used to answer the research questions raised. Moreover, after descriptive analysis was achieved, item that mean was below 3.50 was removed. The normality of the data

for each construct was ensured before proceeding on Confirmatory Factor Analysis (CFA). The CFA was done using structural equation model (SEM) software. A mean of 3.50 was used as the cut-off point for the decision rule for each item. Based on this value, any item with a mean of 3.50 and above was considered appropriate and suitable for the module, while any item with a mean below 3.50 was considered inappropriate and not suitable for the module. Thus for every fitted model, all the factor loadings must be equal to or above 0.50. Similarly, the modification indices such as CFI, IFI, and TLI must be above 0.90; the ratio of the Chi-square and the Degree of freedom (df) < 3 and RMSEA < 0.08. Thus, the revised models were performed wherever the initial CFA models did not meet up with the stated condition.

6. RESULTS

What are the required contents of the employability skills module in the repair and maintenance of smartphones for Technical College students in southwest, Nigeria?

To answer the research question **1** mean and Confirmatory Factor Analysis were used. The result of the computation is as presented in Table 1 as well as Figure a and b.

Table1. Appropriate and Suitable Contents for Implementing Employability Skills Module in the Repair and Maintenance of Smartphones.

Table 1: Contents of the Employability Skills Module in the Repair and Maintenance of Smartphones.

	Items on Contents of the employability skills module in the repair of SP are:	$\overline{X}$	S.D	Remarks
14	Technical skills components such as battery's power switch system.	4.36	0.49	Required
15	Interpretation of electronic component symbols in smartphones motherboard.	4.25	0.63	Required
16	Identifying the potential hazards of smartphones while repairing.	4.29	0.70	Required
17	Identifying appropriate faults before disassembling of smartphones for repairing.	4.40	0.80	Required
18	Identifying the parts of a smartphone.	4.49	0.66	Required
19	Uses of the appropriate tools for repair of smartphones.	4.50	0.72	Required
20	Consider quality while selecting tools and equipment for repairing smartphones in the market.	4.43	0.76	Required
21	Consider durability while selecting tools and equipment for repairing smartphones.	4.44	0.76	Required
22	Using appropriate equipment for diagnosing smartphone faults.	4.53	0.69	Required
23	Using appropriate tools for repairing a smartphone.	4.46	0.71	Required
24	Tracing the smartphone's faults with a standard multimeter.	4.36	0.66	Required
25	Tracing the smartphone for voltage linkage with a multimeter.	4.23	0.88	Required
26	Use of jumper where the problem is persistent.	4.32	0.86	Required
27	Testing the smartphone's components with a multimeter.	4.35	0.75	Required

The data presented in Table 1 revealed 14 contents that were suitable and appropriate for the Employability Skills Module in the Repair and Maintenance of Smartphones. The Means for the contents ranged from 4.23 to 4.53. Each Mean is above the cut-off of 3.50 showing that all were required for the development of the Employability Skills Module in the Repair and Maintenance of Smartphones. The standard deviation of the contents also ranged from 0.49 to 0.88. This revealed that the respondents were close to one another in their opinions and that they were not far from the means. The confirmatory factor Analysis of the above items is performed on figures a and b.

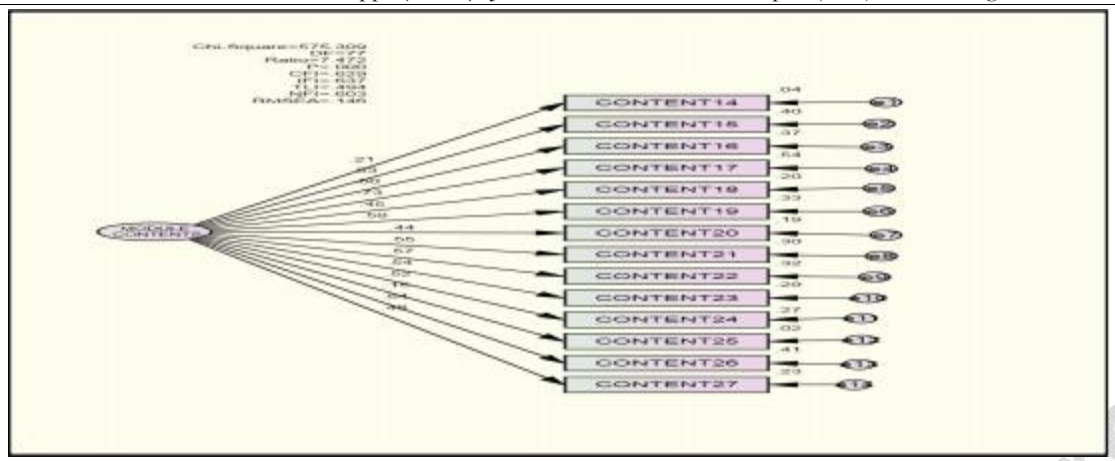

Figure a: Repair and Maintenance of Smartphones

The initial model figure12 had 14 items, based on Confirmatory Factor Analysis (CFA) on contents of the

Employability Skills Module in the Repair and Maintenance of Smartphones was not found fitted. The Chi-square = 575.309, df = 77, P = .000, the ratio of the Chi-square and the df (>3) = 7.471,NFI =.603(< .90), CFI = .629(< .90), IFI = .637(< .90), TLI = .494(< .90) and RMSEA = .146(>.080).Thus, in order to fulfill the requirements, the initial model

figure10 was trimmed sequentially so that the items remaining will fit well to the data at P > 0.05 which the modification indices(NFI,CFI,IFI,TLI) and RMSEA measured up to the standard as shown in figure b below

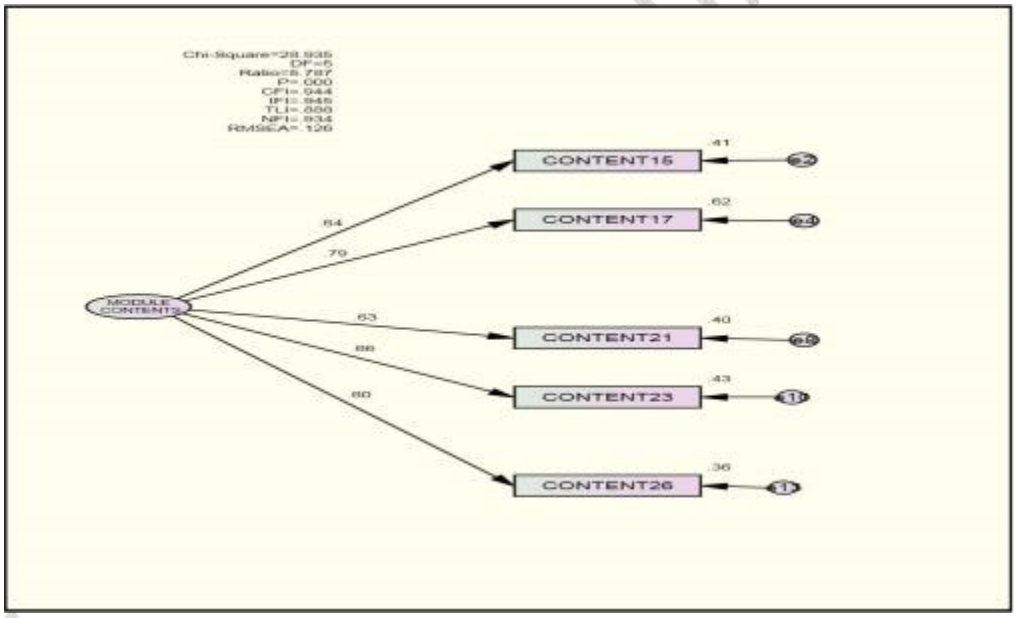

Figure b: Final Model on Contents of the Employability Skills Module in the Repair and Maintenance of Smartphones.

The final model developed in figure b, on Contents of the Employability Skills Module in the Repair and Maintenance of Smartphones had five items with factor loadings ranging from .60 to .79. The Chi-square = 28.935, df = 5, P = .000, the ratio of the Chi- square and the df (< 3) = 5.787, NFI = .934(>.90), CFI = .944(>.90), IFI = .934(>.90), TLI = .888(>.90) and RMSEA = .126(>.080). The validity and reliability of the model is presented in Table 2.

Table 2: Factor Loadings of Contents of the Employability Skills Module in the Repair and Maintenance of Smartphone

CODE	Item Statements	Initial Model	Final Model	Validity/ Reliability

Items	Contents	Factor Loading	Error Variance	Factor Loading	Error Variance	CR	AVE
CON14	Technical skills components such as battery, power switch	**.21**	**.04**	Deleted			
CON15	Interpretation of electronics component symbols in smartphone's mother board.	**.53**	**.40**	.64	**.41**		
CON16	Identifying the potential hazard of smartphone repair	**.60**	**.37**	**Deleted**			
CON17	Identifying appropriate faults before disassembling a smartphone repar.	**.73**	**.54**	**.79**	**.62**		
CON18	Identifying the parts of a smartphone.	**.45**	**.20**	**Deleted**			
CON19	Uses of the appropriate tools for repair of a smartphone.	**.58**	**.33**	**Deleted**			**0.55**
CON20	Consider quality while selecting tools and equipment for repairing smartphone in the market.	**.44**	**.19**	**Deleted**		**0.80**	
CON21	Consider durability while selecting tools and equipment for repairing smartphone	**.55**	**.30**	**.63**	**.40**		
CON22	Using appropriate equipment for diagnosing a smartphone' faults	**.57**	**.32**	**Deleted**			
CON23	Using appropriate tools for repair a smartphone	**.54**	**.29**	**.66**	**.43**		
CON24	Tracing the smartphone fault with standard multimeter.	**.52**	**.27**	**Deleted**			
CON25	Tracing the smartphone for voltage linkage with multimeter	**.15**	**.02**	**Deleted**			
CON26	Use of jumper where the problem is persistent.	**.64**	**.41**	**.60**	**.36**		
CON27	Testing the smartphones components with multimeter	**.48**	**.23**	**Deleted**			

The initial factor loadings of the contents of the Employability Skills Module in the Repair and Maintenance of Smartphones in Table 2 above, had initial factor loadings of 14 items ranging from .15 to .73. While the final factor loading had five items with factor loadings ranging from .36 to .62. Each factor loading was above the cut- off of 0.5 showing that all were required for the development of Employability Skills Module in the Repair and Maintenance of

Smartphones. The Composite Reliability (CR) of the contents of the Employability Skills Module in the Repair and Maintenance of Smartphones is 0.80, while the Average Variance Extracted (AVE) is 0.55

Research Question 2

What are the required teaching methods for implementing the employability skills module in the repair and maintenance of smartphones for Technical College students in southwest, Nigeria?

Results: To answer research question three, mean and Confirmatory Factor Analyses were used. The result of the computation is presented in Table 3

Table 3: Teaching Methods for Implementing the Employability Skills Module in the Repair and Maintenance of Smartphones.

S/N	Items on Teaching methods for implementing the employability skills modules in the repair of SP are:	$\bar{X}$	S.D	Remarks
28	Demonstration method	4.40	0.51	Required
29	Guided discovery method	4.34	0.63	Required
30	Cognitive apprenticeship instructional method	3.85	1.02	Required
31	Project method	4.29	0.68	Required
32	Programmed instructional method	3.98	1.14	Required
33	Field trip method	3.80	1.18	Required
34	Lecture method	3.93	1.17	Required
35	Questioning method	4.19	0.89	Required
36	Independent study method	3.87	1.08	Required
37	Exhibition method	4.00	1.00	Required
38	Meta learning method	3.69	1.14	Required
39	Systematic reporting method	3.65	1.33	Required

The data presented in Table 3 revealed teaching methods that were suitable and appropriate for the Employability Skills Module in the Repair and Maintenance of Smartphones. The Means for the teaching methods ranged from 3.65 to 4.40. Each Mean is above the cut-off of 3.50 showing that all were required for the development of the Employability Skills Module in the Repair and Maintenance of Smartphones. The standard deviation of the teaching methods also ranged from 0.51 to 1.33. This revealed that the respondents were close to one another in their opinions and that they were not far from the mean. The confirmatory factor Analysis of the above items is performed on figures c and d.

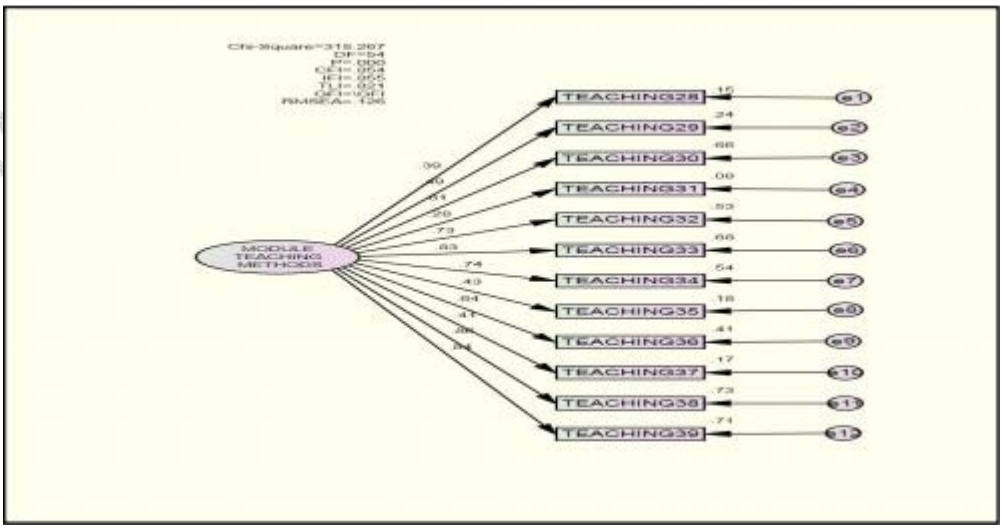

Figure c: Teaching Methods for implementing Employability Skills Module

In the Repair and Maintenance of Smartphones was 12 items not found fitted and not comply with a goodness model fit. The Chi-square = 315.267, df = 54, P = .000, the ratio of the Chi-square and the df (> 3) =5.83, (< .90), CFI = .854(<.90), IFI = .855(<.90), TLI = .821(<.90) and RMSEA = .126(>.080). Thus, in order to fulfill the requirements, the model was trimmed sequentially so that the items remaining will fit well to the data at P>0.05. While the modification indices (CFI, IFI, TLI) and RMSEA measured up to the standard.

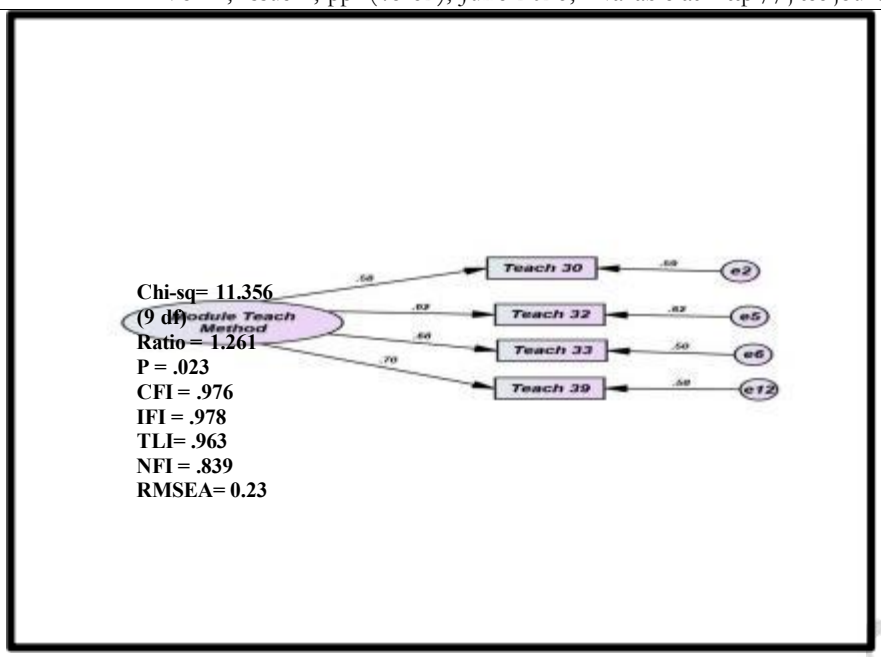

Figure d: Final Model for Teaching Methods for Implementing Employability Skills Module in the Repair and Maintenance of Smartphones.

The final model develop on Teaching Methods for Implementing Employability Skills Module in the Repair and Maintenance of Smartphones had four(4) items with factor loadings ranging from .58 to.72,as shown in figure 15. The Chi-square =11.356, df = 9, P= .023, the ratio of the Chi-square and the df < 3) = 1.261, NFI = .839(>.90), CFI = .976(>.90), IFI = .978(.90), TLI = .963(>.90) and RMSEA =.023(080). The validity and reliability of the model is presented in Table 4.

Table 4: Factor Loadings of Teaching Methods for the Employability Skills Module in the Repair and Maintenance of Smartphone

CODE	Item Statements	Initial Model		Final Model		Validity/ Reliability	
Items	Teaching Methods	Factor Loading	Error Varia-nce	Factor Loadi -ng	Error Variance	CR	AVE
Teach 28	Demonstration method	.30	.15	Deleted			
Teach 29	Guided discovery method	.49	.24	Deleted			
Teach30	Cognitive apprenticeship instructional method	.61	.66	.58	.59		
Teach 31	Project method	.28	.08	Deleted			
Teach 32	Programmed instructional method	.73	.53	.72	.62		
Teach 33	Field trip method	.83	.68	.68	.50		
Teach 34	Lecture method	.74	.54	Deleted		0.77	
Teach 35	Questioning method	.43	.18	Deleted			0.66
Teach 36	Independent study method	.64	.41	Deleted			
Teach 37	Exhibition method	.41	.17	Deleted			
Teach 38	Meta learning	.88	.73	Deleted			

Teach 39	Systematic reporting method	**.81**	**.71**	**.70**	**.58**

The initial factor loadings of the teaching methods for implementing the Employability Skills Module in the Repair and Maintenance of Smartphones from table 4 had initial factor loadings of 12 items ranging from .28 to.88. While the final factor loadings had four items with factor loadings ranging from .58 to .72. Each factor loadings is above the cut-off of 0.5 showing that all were required for the development of Employability Skills Module in the Repair and Maintenance of Smartphones. The Composite Reliability (CR) of the teaching methods for implementing the Employability Skills Module in the Repair and Maintenance of Smartphones is 0.77while the Average Variance Extracted (AVE) is 0.66

Table5: Validity and Reliability of the Employability Skills Module in the Repair and Maintenance of Smartphones

CODE	**Items Statement**	**Initial model**		**Revised model**		**Validity/Reliability**	
Items		**Factor Loading**	**Error Variance**	**Factor Loadi ng**	**Error Variance**	**CR**	**AVE**
	Contents						
CON14	Technical skills components such as battery, power switch	**.21**	**.04**	Deleted			
CON15	Interpretation of electronics component symbols in smartphone's mother board.	**.53**	**.40**	.64	**.41**		
CON16	Identifying the potential hazard of smartphone repair	**.60**	**.37**	**Deleted**			
CON 17	Identifying appropriate faults before disassembling a smartphone repair.	**.73**	**.54**	**.79**	**.62**		
CON18	Identifying the parts of a smartphone.	**.45**	**.20**	**Deleted**			
CON19	Uses of the appropriate tools for repair of a smartphone.	**.58**	**.33**	**Deleted**			
CON20	Consider quality while selecting tools and equipment for repairing smartphone in the market.	**.44**	**.19**	**Deleted**			**0.55**
CON21	Consider durability while selecting tools and equipment for repairing smartphone	**.55**	**.30**	**.63**	**.40**	**0.80**	

CON22	Using appropriate equipment for diagnosing a smartphone' faults	**.57**	**.32**	**Deleted**			
CON23	Using appropriate tools for repair a smartphone	**.54**	**.29**	**.66**	**.43**		
CON24	Tracing the smartphone fault with standard multimeter.	**.52**	**.27**	**Deleted**			
CON25	Tracing the smartphone for voltage linkage with multimeter	**.15**	**.02**	**Deleted**			
CON26	Use of jumper where the problem is persistent.	**.64**	**.41**	**.60**	**.36**		
CON27	Testing the smartphones components with multimeter	**.48**	**.23**	**Deleted**			
	Teaching Methods						
Teach28	Demonstration method	**.30**	**.15**	**Deleted**			
Teach29	Guided discovery method	**.49**	**.24**	**Deleted**			
Teach30	Cognitive apprenticeship instructional method	**.61**	**.66**	**.58**	**.59**		
Teach31	Project method	**.28**	**.08**	**Deleted**			
Teach32	Programmed instructional method	**.73**	**.53**	**.72**	**.62**		
Teach33	Field trip method	**.83**	**.68**	**.68**	**.50**		**0.66**
Teach34	Lecture method	**.74**	**.54**	**Deleted**		**0.77**	
Teach35	Questioning method	**.43**	**.18**	**Deleted**			
Teach36	Independent study method	**.64**	**.41**	**Deleted**			
Teach37	Exhibition method	**.41**	**.17**	**Deleted**			
Teach38	Meta learning	**.88**	**.73**	**Deleted**			
Teach39	Systematic reporting method	**.81**	**.71**	**.70**	**.58**		

Key: CR = Composite Reliability; AVE = Average Variance Extracted.

The data presented in **Table 5.** Revealed the validity and reliability of the CFA model having obtained factor loadings for all the items above 0.50 and each item error variance is equal to or above 0.25. The Composite Reliability for each of the Objectives, Contents, Teaching Methods, Learning Activities, Facilities and Evaluation Techniques are 0.78, 0.80, 0.77, 0.80, 0.96, and 0.85 respectively. The Average Variance Extracted (AVE) for each of the Objectives, Contents,

Teaching Methods, Learning Activities, Facilities and Evaluation Techniques are 0.55, 0.55, 0.66, 0.52, 0.95, and 0.66 respectively. The detail of module for teaching employability skills in the repair and maintenance of smartphones is presented in appendix IV

7. Discussion of Findings

The findings of the study on contents of the Employability Skills Module in the Repair and Maintenance of Smartphones revealed that five contents are adjudged necessary for the Employability Skills Module in the Repair and Maintenance of Smartphones. This findings are in line with Bakare (2015) where one hundred and fourty contents were required for the development of cell phone maintenance training module for National Diploma students. The submission of Yisa (2016) also indicated twenty four contents were required for the development of skill training module in fabrication and welding, also Olakotan (2021) revealed five contents were required for Employability Skills Module in Aluminium Fabrication and Glazing Work. The submission of Bakare (2014);Yisa (2016), and Olakotan(2021) are buttressed the findings of the study as the duo noted that content captures the list of subjects, topics, skills, themes , concepts or work to be covered by teacher and his students. The position of Olakotan(2021) was also in consonance with the finding of this study, as Olakotan posited that the selection of content is premised on certain criteria such as validity, significance, interest of the students, learnability, and consistency with social realities.

Therefore, the contents of the Employability Skills Module in the Repair and Maintenance of Smartphones include: technical skills components, such as battery, power switch, interpretation of electronics component symbols in smartphone's mother board, uses of the appropriate tools for repair of a smartphone, use of jumper where the problem is persistent. Also the findings of the study on contents revealed that Composite Reliability and Average Variance Extracted are in line with the Olakotan (2021). Also the findings revealed that five contents are adjudge necessary by technical teachers, technical instructors, road side smartphones technicians, and industrial based supervisors for the Employability Skills Module in the Repair and Maintenance of Smartphones.

The findings of the study on required teaching methods for implementing the Employability Skills Module in the Repair and maintenance of smartphones revealed that twelve teaching methods are adjudged necessary for implementing the Employability Skills Module in the Repair and Maintenance of Smartphones. The findings on the teaching methods for implementing the Employability Skills Module in the Repair and Maintenance of Smartphones are in agreement with the submission of Olakotan (2021) were six teaching methods are adjudged necessary for implementing the Employability Skills Module in Aluminum Fabrication and Glazing work. Similarly the findings is line with Festus (2016) where twenty delivery teaching methods were appropriate for developed important of power metallurgy technology course of study for students in Polytechnic. The findings of the study on required teaching methods revealed that the Composite Reliability and Average Variance Extracted are in line with the Olakotan (2021). Also the findings revealed that six teaching methods are adjudge necessary by technical teachers, technical instructors, road side smartphones technicians, and industrial based supervisors for the Development of Employability Skills Module in the Repair and Maintenance of Smartphones. Also Bakare (2015); Fadairo (2015); Olakotan (2021), are averred that teaching methods were adopted by the teacher to explain subject matter to learners which in effect enhance effective teaching. Ogundola (2017) noted that teachers should adopt constructivist approach for effective teaching and learning in schools. While Oke and Olakotan (2019) submitted that the magnitude of development noticed in any society is dependent on the quality of teaching methods adopted by the teacher. This is because institutions and teachers who adopted best practices in imparting knowledge and skills to students remain at the forefront of societal development. Hence six teaching methods suitable for implementing Employability Skills Module in the Repair and Maintenance of Smartphones as noted by technical teachers, technical instructors, road side smartphones technicians and industrial based supervisors are but not limited to the following: guided discovery methods, lecture methods, practical methods, field trip, demonstration methods, exhibition methods, questioning methods among others. The Composite Reliability for Contents, and Teaching Methods, are 0.78, 0.80, respectively. The Average Variance Extracted (AVE) for each of the Contents and Teaching Methods, are 0.55, 0.55, respectively.

8. Conclusion

Smartphones had been replaced the previous used of land phones, for communication in all spheres of human endeavours. Smartphone allows people to make and receive calls while moving around a wide geographical area. Smartphone also supports several functions, such as text messaging, email and internet access, photography, and money transfer, both in urban and rural areas.

The widespread ownership and users of smartphones has created a need for professionals skilled technicians who can repair and service smartphones for the users. This urgent need, calls for craftsmen and Technicians who are a thorough breed of the nation's technical colleges to immerse themselves in the art of repairing and maintaining smartphones. All these by implication offer great opportunity to develop Employability Skills Module in the Repair and Maintenance of Smartphones. The Validity of the module ensured with modification index, reliability of the module ensured with composite reliability, while the usability was ensured with average variance extracted.

The validity, reliability and usability adopted procedure, and the appropriateness of the developed contents and teaching methods, were investigated and the findings confirmed them suitable for the Employability Skills Module in the Repair and Maintenance of Smartphones for Technical College Students in Nigeria. The inclusion of Repair and Maintenance of Smartphones into Technical College trades at the National Technical certificate (NTC) level in Nigeria would enhance self-employment or self- reliance and manpower development through contents and teaching of the theories and practices of

Repair and Maintenance of Smartphones which preliminary and exploratory field survey revealed that would be solved the problems of unemployment among Technical College graduates in southwest and in Nigeria at large.

9. Recommendations

Based on the findings of the study, the following recommendations were made:

1. The developed Employability Skills Module in the Repair and Maintenance of Smartphones should be properly utilized using with appropriate contents and teaching methods, to enhancing the effectiveness of the module for training the students.
2. For effective implementation of the development employability Skills Module in the Repair and Maintenance of Smartphones, government and relevant agencies should intensify effort to provide conducive laboratory for the learners to encourage them to acquire the skills on repair and maintenance of smartphones.
   There should be provision of training materials and human resources to ensure effective utilization of the module.

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