DEVELOPMENT OF APPROPRIATE CONTENTS FOR WIDENING OCCUPATIONAL OPPORTUNITIES OF ELECTRICAL/ELECTRONIC TECHNOLOGY GRADUATES IN AFRICAN ENVIRONMENT TO COPE WITH WORLD OF CHANGE

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Abstract

The study developed appropriate contents for widening the occupational opportunities of electrical/electronic technology graduates of Nigerian universities to cope with world of change. Three research questions guided the study while null hypotheses formulated were tested at 0.05 level of significance. The study adopted descriptive research design and was carried out in Enugu State. The population for the study was 109 subjects comprising lecturers of electrical/electronic technology and supervisors in electrical/electronic related industries. There was no sampling because of manageable size of the subjects. A structured questionnaire titled "Appropriate contents for widening occupational opportunities questionnaire" was used as instrument for data collection. The instrument was validated by three experts and Cronbach alpha reliability method was used to determine the internal consistency of the questionnaire items while 0.84 was obtained. Out of 109 copies of questionnaire administered on respondents with the help of three research assistants, only 101 copies were duly retrieved which represented 92.66 percent return rate. The data collected were analyzed using factor analysis and mean while t-test was used to test the three null hypotheses formulated. The findings revealed 25 local contents, 58 instructional strategies and 45 training facilities for implementing the developed contents for widening occupational opportunities of electrical/electronic technology graduates in African environment. Recommendations include that the contents developed with instructional strategies and training facilities identified should be integrated to electrical/electronic technology programme of Nigerian universities.

Keywords: Local contents, occupation, change, opportunities, factor analysis, integration

Introduction

There are various educational programmes in the curricula of Nigerian universities and one of such programmes is called industrial technical education. Industrial technical education (ITE) is a special type of education

designed to equip individuals with knowledge, skills, attitudes (competence), techniques, and methods in various occupational areas. Some of the components of industrial technical education programmes in Nigerian universities as at today include: automobile, building, metalwork, woodwork, electrical and electronic technology.

Electrical/electronic technology as an aspect of ITE is expected to equip students with knowledge, skills and attitudes for paid or self employment. It is the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of electronics. College Board (2018) also explained that in electronics technology, students learn the basic skills needed to operate, maintain, install and repair electrical and electronic equipment. In electrical/electronic technology according to Knight (1994), students may study the behaviour of electrons and the practical uses to which such study can be applied. The graduates of electrical/electronic technology are expected to acquire skills or knowledge to construct, maintain, repair and service all kinds of electrical and electronic equipment and machines (Bakare, 2009). They are also expected to take up business or occupations within electrical/electronic technology. But what is happening to graduates in Nigerian society today is quite different from the purpose or objective of electrical/electronic technology programme. The graduates of electrical/electronic technology based on the findings of previous studies are not well equipped with relevant knowledge, skills and attitudes for paid jobs or to set up their own businesses. It is observed that the present contents of electrical/electronic technology programme of Nigerian universities are narrowed and obsolete and the facilities meant for effective implementation of these contents are not available for use while the available ones are also obsolete. Teachers of electrical/electronic technology also hardly teach their courses using modern strategies that can encourage skills acquisition and effective learning. World is changing and people in it make use of emerging technologies in their homes and offices. All these technologies will require maintenance with time and there is need for people to take occupation in them

Occupation is an activity through which one earns a living. Dictionary of occupational titles (2017) defined occupation as any activity in which a person engaged. Ede (2011) maintained that an occupation requires special training. Therefore emerging technologies as occupations involve some training in order to make students and graduates beneficially competent in them. Widening the contents of electrical/electronic technology programme has

become imperative for the training of students and for occupational opportunities of graduates.

Content of a training programme gives directions to the trainers and the trainees. Content as defined by Bakare (2014) is what the teacher and the students pay attention to when they are teaching and learning. Kapoma and Namusokwe (2011) described content as a list of subjects, topics, skills, themes, concepts or works to be covered by teacher and his students. Content of a training programme can be in form of competence, skills, techniques, concepts or attitudes. The contents in this study are the skills, knowledge and attitudes for widening the occupational opportunities of electrical /electronic technology graduates. Ogwo in Asogwa (2010) explained that competency is characterized by clearly stated, attainable and measurable objectives, followed by identified knowledge, and skills that learners have to master within a given time frame. These contents if articulated well could be used to teach students and can be also used build the capacities of electrical/electronic technology graduates for occupational quality assurance. Development of good contents for training makes the training easier and efficient. In the opinion of Quirk (1995), development is the act of making an idea clearer by studying it more, by speaking or writing about it in more detail. Asogwa (2010) viewed development as the act of making something more organized. In the context of this study, development of contents involves: (a) determination of local and modern competencies in electrical/electronic technology; (b) identification of training facilities and instructional strategies for teaching the contents; (c) organizing what has been identified sequentially and logically in a manner that will make teaching easy for the trainer and trainees and (d) packaging what has been determined and identified and organized into units or modules of instruction with required facilities

Facilities are physical objects that facilitate a given work or activity. Yavala (2011) explained that facilities are those goods and services that help to facilitate teaching and learning process in any performance. Adequate and relevant training facilities make the learning process more satisfying. Facilities may include relevant tools, devices and equipment for teaching and acquiring relevant skills for maintaining woodwork machines and equipment. Various facilities such as sets of screw drivers, infra red rework station, soldering irons, cutting pliers, vacuum cleaners, magnifying desk lamps, fluxes, multi-meters could be used for maintenance of broken down electronic equipment and implementation of training contents.

Implementation strategies are means of teaching prepared lessons to students. Delivery systems to be selected depend on the contents of the lesson (Bakare, 2014). A good trainer matches the contents of a lesson to delivery systems in order to achieve the objectives of the lesson (Ogbuanya & Bakare, 2017). Application of appropriate implementation strategies or delivery systems improves students' understanding. It enables the students to acquire relevant skills and knowledge. Ezeilo (2001) suggested delivery systems such as seminars, workshops and conferences. Implementation strategies or delivery systems are different teaching methods or techniques and related resources for facilitating the implementation of the contents for widening occupational opportunities of electrical/electronic graduates. Both experienced lecturers and supervisors in electrical/electronic industries could help retrain the graduates for occupational quality assurance. The general purpose of the study was to develop appropriate contents for widening occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change. Specifically the study sought to determine the:

1. competencies (contents) for widening occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change

2. Instructional strategies for implementing the contents for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change

3. Training facilities that could be utilized by trainers for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change

Research questions

The following research questions were posed:

1. What are the competencies (contents) for widening occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change?

2. What are the instructional strategies for implementing the contents for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change?

3. What are the training facilities that could be utilized by trainers for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change?

Hypotheses

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

1. There is no significant difference in the mean responses of respondents on the competencies (contents) for widening occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change

2. There is no significant difference in the mean responses of respondents on the instructional strategies for implementing the contents for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change

3. There is no significant difference in the mean responses of respondents on the training facilities that could be utilized by trainers for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change

Methods

The study adopted a descriptive survey design. Descriptive survey design according to Osuala (2005) is a design that studies characteristics and focuses on people, the vital facts of people and their beliefs, opinions, attitude, motivation and behaviors. Descriptive research design according to Kothari and Garg (2014) is appropriate for those studies which are concerned with describing the characteristics of a particular individual, or of a group. The descriptive survey design was therefore adopted for this study because it aimed at using questionnaire to elicit facts, beliefs and opinions of experts about the development of contents for widening occupational opportunities of electrical/electronic technology graduates.

The study was conducted in Enugu State of Nigeria. The population for the study was 203 which comprised lecturers of electrical/electronic technology and supervisors in electrical/electronic industries in Enugu State. There was no sampling because of the manageable size of the population. A structured questionnaire titled: Appropriate Contents for Widening Occupational

Opportunities Questionnaire (ACWOOQ) was used for data collection and was on 5-point Likert scale. The structured questionnaire had 139 items developed for collecting data in accordance with the research questions. The instrument was organized in three sections A-C. A centered on competencies (contents) for widening occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change, B dealt with instructional strategies for implementing the contents for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change while C centered on training facilities that could be utilized by trainers for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change. Each item in the instrument was assigned a five response scale of Strongly Agree or Required (SA or SR)-5, Agree or Required (A or R)-4, Undecided (U)-3, Disagree or Not Required (D or NR)-2, and Strongly Disagree or Not Required (SD or SNR)-1point. According to Lozano et al (2008), an instrument can be considered good for validity and reliability if it has between four (4) and seven (7) alternative responses. However, fewer options are acceptable depending on the purpose and scope of the study (Bendig 1954; Mattell and Jacoby 1971; Jones and Scott 2013). The respondents were therefore asked to rank the response options to an item based on the level at which each item was required.

The instrument was face-validated by three experts. These were experts in Department of Industrial Technical Education, University of Nigeria Nsukka and Department of Art Education. The title of the study, specific purposes, research questions and null hypotheses formulated were attached to each copy of the questionnaire given to the experts. The experts were asked to read the items under each research question and make useful corrections in order to improve the standard of the questionnaire. The experts were also requested to add any relevant item to the questionnaire. After one week, one of the researchers went round to collect the copies of the questionnaire given to the experts and effected the corrections accordingly. One hundred and thirty nine items were retained out of 147 items presented to experts in form of questionnaire.

In other to establish the internal consistency of the questionnaire items, Cronbach Alpha test of internal consistency was conducted on each section in the part 2 of the questionnaire. The researchers administered 20 copies of the structured questionnaire on lecturers of Electrical/electronic technology and supervisors in institutions and industries in Anambra State. The reason for

administering the copies of the questionnaire on other set of respondents outside the study area was to obtain real reliability coefficient values for each sections of the questionnaire (Roberts, 2012). Statistical Packages for Social Sciences (SPSS) 22 versions was found useful for data analysis. The result of the Cronbach alpha revealed the following: competencies (contents) for widening occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change (& = 0.81, n=20), instructional strategies for implementing the contents for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change (&= 0.81, n= 20), training facilities that could be utilized by trainers for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change (&= 0.78, n= 20) while the overall reliability index yielded &= 0.89, n= 20. According to guidelines by Sekaran (2003), a coefficient of .60 is considered to be poor, 0.70 is acceptable, while over 0.80 is good. Olelewe and Agomuo (2016) also stated that the closer the Cronbach's alpha is to 1, the higher the internal consistency.

Out of one hundred and nine copies of the questionnaire administered to the respondents by the researchers, only 101 copies were duly retrieved which represent 92.12 percent return rate. Data collected were analyzed using factor analysis and mean for answering the research questions. For selecting the appropriate competencies for widening occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change, 0.50 as factor loading was utilized. Any competency with factor loading of 0.50 or above was regarded as required and any competency with factor loading less than 0.50 was regarded as not required. Also, any item with mean of 3.50 was regarded as required or appropriate while any one with mean below 3.50 was regarded as not required or not appropriate. T-test was employed for testing all the null hypotheses at 0.05 and relevant degrees of freedom. The null hypothesis of no significant difference was accepted for any item whose P- value was greater than the 0.05, but it was rejected for any item whose P-value was less than 0.05.

Results

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

Tables I
Outcome of Factor Analysis for answering Research Question One and t test for Testing Hypothesis One

S/N	Contents	Factor loading at 0.50	P-values	Remarks, Ho
A	**Local contents inform of competencies**			
1	Construction of extension sockets using local materials such as woods as casing	0.95	0.53	**Required, NS**
2	Construction of alarms using local materials	0.60	0.34	**Required, NS**
3	Troubleshooting of faults in extension sockets and alarms	0.85	0.56	**Required, NS**
4	Construction and assemblage of solar power panel locally	0.71	0.33	**Required, NS**
5	Maintenance of locally made solar power systems	0.78	0.24	**Required, NS**
6	Installation of locally made solar power system	0.82	0.16	**Required, NS**
7	Construction of automatic voltage regulators using some local materials	0.58	0.53	**Required, NS**
8	Construction of non ozone layer depletion refrigerator and air conditioners	0.56	0.41	**Required, NS**
9	Installation of non ozone layer depletion refrigerator and air conditioners	0.63	0.56	**Required, NS**
10	Maintenance of non ozone layer depletion refrigerator and air conditioners	0.73	0.34	**Required, NS**
11	Construction of illuminated white board for teaching in remote areas	0.78	0.26	**Required, NS**
12	Wiring of houses and installation of electrical equipment locally made	0.82	0.31	**Required, NS**
13	Design and construction of fire detector for homes and offices	0.56	0.34	**Required, NS**

14	Designing standard termination boards for houses and offices	0.79	0.21	**Required, NS**
15	Design and construction of distribution boards	0.73	0.25	**Required, NS**
16	Design and Construction of electrical panels for the machines and heavy equipment	0.67	0.12	**Required, NS**
17	Making of safety devices locally to protect electronics and machines	0.61	0.32	**Required, NS**
18	Design and construction of amplifiers and other sound systems	0.59	0.11	**Required, NS**
19	Design and construction of frequency filters	0.63	0.33	**Required, NS**
20	Rewinding of electric motor and speakers	0.62	0.23	**Required, NS**
21	Rewinding of burn transformers locally	0.77	0.13	**Required, NS**
22	Servicing of all locally made electrical equipment and devices	0.60	0.21	**Required, NS**
23	Repairing of locally made electrical/electronic equipment when faulty	0.62	0.41	**Required, NS**
24	Construction of locally made ovens and radiation	0.61	0.12	**Required, NS**
25	Design and construction of hot plates and immersion heater for kitchen use	0.55	0.23	**Required, NS**
26	Construction of rechargeable lantern and torches	0.68	0.54	**Required, NS**
27	Making of locally made electrical switches	0.61	0.50	**Required, NS**
B	**Modern contents in form of competencies**	0.55	0.43	**Required, NS**
29	Maintenance of microwave oven	0.62	0.34	**Required, NS**
30	Service and repair of plasma televisions	0.59	0.43	**Required, NS**
31	Maintenance of flat screen TVs	0.65	0.13	**Required, NS**

32	Operation of robotics and automation	0.78	0.34	**Required, NS**
33	Servicing of recent cameras such as autofocus cameras	0.59	0.23	**Required, NS**
34	Maintenance of consumer electronics	0.69	0.54	**Required, NS**
35	Knowledge about industrial electronic and applications	0.56	0.23	**Required, NS**
36	Maintenance of all kinds of smart phones	0.66	0.11	**Required, NS**
39	Servicing and repairing of ipads and other recent telecommunication technologies	0.78	0.21	**Required, NS**
40	Servicing of e-teaching technologies	0.66	0.21	**Required, NS**
41	Maintenance and use of interactive white boards	0.68	0.17	**Required, NS**
42	Servicing and repairing of mechatronics	0.75	0.44	**Required, NS**
43	Maintenance of automated teller machines	0.62	0.24	**Required, NS**
44	Fixing and maintenance of power windows and doors	0.54	0.13	**Required, NS**
45	Servicing and repair of modern air conditioners	0.65	0.41	**Required, NS**
46	Maintenance of recent refrigerators	0.51	0.33	**Required, NS**
47	Maintenance of modern washing machines	0.52	0.28	**Required, NS**
48	Servicing of keyless entry	0.55	0.42	**Required, NS**
49	Maintenance of compact disk and video players	0.59	0.30	**Required, NS**
50	Servicing of power transformers	0.65	0.42	**Required, NS**

Keys: *NS = Not significant, Ho = Hypothesis,*

Data in Table 1 reveal that factor loading of the competencies ranged from 0.50 to 0.95. This indicated that all the 50 competencies could be used as contents for widening the occupational opportunities of electrical/electronic

technology graduates. The table also indicated that each item had its P-value greater than 0.05. This showed that there was no significant difference in the mean responses of respondents on the competencies (contents) for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change. Therefore, the hypothesis of no significant difference was upheld for the 50 competencies for widening the occupational opportunities of electrical/electronic technology graduates in woodwork machine maintenance.

Tables II

Mean Responses of the Respondents on the Instructional Strategies for implementing the Contents for Widening the Occupational Opportunities of Electrical/Electronic Technology Graduates

S/N	Instructional strategies	Mean	S.D.	P-values	Remarks, Ho
1	Adoption of e-teaching for instructional delivery	3.98	0.77	0.53	**Required, NS**
2	Learning by doing	3.76	0.79	0.34	**Required, NS**
3	Compact disc and cassettes in presentation	3.85	0.81	0.56	**Required, NS**
4	Audio-visual materials/objects	3.80	0.89	0.33	**Required, NS**
5	Films and videos in delivering lectures	3.78	0.83	0.24	**Required, NS**
6	Workshops on modern electrical/electronic maintenance	3.82	0.86	0.16	**Required, NS**
7	Group dynamic	3.58	0.85	0.53	**Required, NS**
8	Adoption of dualised training	3.50	0.89	0.41	**Required, NS**
9	Using internet as a means of instruction delivery	3.63	0.82	0.56	**Required, NS**
10	Questioning technologists about what they know	3.80	0.80	0.34	**Required, NS**
11	Interactive lecture	3.78	0.71	0.26	**Required, NS**
12	Use of practice teaching	3.82	0.93	0.31	**Required, NS**
13	Prepare and deliver skills to be	3.56	0.81	0.34	**Required,**

	taught to students in slides				**NS**
14	Deliver lectures inform of film show to technologists	3.79	0.84	0.21	**Required, NS**
15	Simulation as teaching strategy	3.73	0.88	0.25	**Required, NS**
16	Tape recorders to instruct technologists	3.67	0.72	0.12	**Required, NS**
17	Using flow charts when instructing trainees	3.61	0.80	0.32	**Required, NS**
18	Using different types of film shows for instruction delivery	3.55	0.70	0.11	**Required, NS**
19	Using circuit diagrams of different types of electronics for training	3.66	0.82	0.42	**Required, NS**
20	Using scraps of different types of electronics	3.95	0.73	0.53	**Required, NS**
21	Small hands-on group training	3.76	0.79	0.34	**Required, NS**
22	Evidenced based learning	3.85	0.71	0.56	**Required, NS**
23	Using large group training	3.80	0.90	0.33	**Required, NS**
24	Conversation with questions posed to elicit thoughtful responses from learners	3.78	0.83	0.24	**Required, NS**
25	Verbal instructions	3.82	0.86	0.16	**Required, NS**
26	Using photo sequences	3.58	0.85	0.53	**Required, NS**
27	Using picture/images of different types of electronic equipment for teaching	3.50	0.89	0.41	**Required, NS**
28	Film viewing	3.63	0.81	0.56	**Required, NS**
29	Dual training	3.80	0.81	0.34	**Required, NS**
30	Group dynamic	3.78	7.00	0.26	**Required, NS**
31	Distance learning	3.82	0.93	0.31	**Required, NS**
32	Self paced learning	3.56	0.81	0.34	**Required, NS**

33	Simulation	3.79	0.84	0.21	**Required, NS**
34	Action plan preparation and presentations	3.73	0.88	0.25	**Required, NS**
35	Symposium	3.67	0.71	0.12	**Required, NS**
36	Individual and small group work and presentations	3.61	0.80	0.32	**Required, NS**
37	Experience sharing	3.55	0.70	0.11	**Required, NS**
38	Story analysis	3.66	0.82	0.42	**Required, NS**
39	Brainstorming	3.95	0.71	0.53	**Required, NS**
40	Inquiry based learning	3.76	0.79	0.34	**Required, NS**
41	Seminar	3.85	0.81	0.56	**Required, NS**
42	Group Exercises	3.80	0.90	0.33	**Required, NS**
43	Webinar	3.78	0.83	0.24	**Required, NS**
44	Debate	3.82	0.86	0.16	**Required, NS**
45	Cooperative learning	3.58	0.85	0.53	**Required, NS**
46	Project based learning	3.50	0.89	0.41	**Required, NS**
47	Action based learning	3.63	0.81	0.56	**Required, NS**
48	Challenge based learning	3.80	0.81	0.34	**Required, NS**
49	Activity based learning	3.78	0.76	0.26	**Required, NS**
50	Project method	3.82	0.93	0.31	**Required, NS**
51	Cognitive apprenticeship instructional method	3.67	0.71	0.12	**Required, NS**
52	Guided discovery method	3.64	0.80	0.32	**Required, NS**
53	Panel discussion	3.55	0.70	0.11	**Required,**

					NS
54	Learning mode	3.50	0.82	0.42	**Required, NS**
55	Meta-learning	3.95	0.71	0.53	**Required, NS**
56	Reciprocal peer tutoring	3.76	0.79	0.34	**Required, NS**
57	Programmed instructional method	3.85	0.83	0.56	**Required, NS**
58	Presenting lessons in power points and slides	3.67	0.79	0.21	**Required, NS**

Keys: *S.D. = Standard Deviation, NS = Not significant, Ho = Hypothesis, Sig. = significance*

Data in Table 2 reveal that 58 items had their mean values ranged from 3.51 to 3.98 and this shows that the mean value of each item was above the cut-off point of 3.50, indicating that all the 57 instructional strategies were required for implementing the contents for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change. The Table also shows that the standard deviations of the items were within the range of 0.73 to 0.90; this indicated that the respondents were not far from the mean and one another in their responses. The Table 2 also indicated that all the items had their P-values greater than 0.05 which means that there was no significant difference in the mean responses of the respondents on the instructional strategies for implementing the contents for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change. Therefore, the null hypothesis of no significant difference was upheld for all the 58 instructional strategies

Tables III
Mean Responses of the Respondents on the Training Facilities that could be Utilized for Widening Occupational Opportunities of Electrical/Electronic Technology Graduates

S/N	Training facilities	Mean	S.D.	P-values	Remarks, Ho
1	Smart and conducive workshop for training	3.73	0.70	0.53	**Required, NS**
2	Constant electricity/power supply	3.60	0.72	0.34	**Required, NS**

3	Internet facilities for downloading relevant materials during training	3.81	0.84	0.56	**Required, NS**
4	Ultrasonic cleaner	3.80	0.85	0.33	**Required, NS**
5	Interactive white board/magic boards	3.77	0.83	0.24	**Required, NS**
6	Projector	3.80	0.86	0.16	**Required, NS**
7	Computer systems	3.58	0.85	0.53	**Required, NS**
8	Power soldering iron	3.56	0.89	0.41	**Required, NS**
9	Soldering lead	3.63	0.78	0.56	**Required, NS**
10	Soldering paste	3.78	0.88	0.09	**Required, NS**
11	Pickers for removing tiny and hidden objects from the machines	3.86	0.80	0.34	**Required, NS**
12	Torque screw driver/precision tools	3.78	0.84	0.26	**Required, NS**
13	Eyelets and eye letting tools	3.82	0.79	0.31	**Required, NS**
14	Hot lead sucker/suction devices for removing melted solder	3.56	0.82	0.34	**Required, NS**
15	Long nose pliers for holding tiny object in hidden place	3.77	0.84	0.21	**Required, NS**
16	Cutting pliers for cutting flexible objects	3.75	0.87	0.25	**Required, NS**
17	Digital multi-testers for testing components and measuring electrical quantities	3.58	0.85	0.53	**Required, NS**
18	Fluxes (Non-corrosive liquid flux) to prevent oxidation during soldering	3.55	0.89	0.41	**Required, NS**
19	Solder-resistant paint used in soldering	3.63	0.78	0.56	**Required, NS**
20	Magnifying lens for enlarging tiny objects	3.78	0.88	0.09	**Required, NS**
21	Magnifying desk lamp	3.86	0.80	0.34	**Required, NS**
22	Smart phones	3.78	0.84	0.26	**Required,**

					NS
23	Ipads	3.82	0.79	0.31	**Required, NS**
24	Meterless meter	3.56	0.82	0.34	**Required, NS**
25	User manuals	3.77	0.84	0.21	**Required, NS**
26	Screw extractors	3.75	0.87	0.25	**Required, NS**
27	Mechatronic products	3.58	0.85	0.53	**Required, NS**
28	Electronic medical equipment	3.59	0.89	0.41	**Required, NS**
29	Digital oscilloscopes	3.63	0.78	0.56	**Required, NS**
30	Special software for diagnosing faults in electronic equipment	3.78	0.88	0.09	**Required, NS**
31	Modern air conditioners and refrigerators	3.86	0.80	0.34	**Required, NS**
32	Power screw drivers	3.78	0.84	0.26	**Required, NS**
33	Anti static wrist strap and mats	3.82	0.79	0.31	**Required, NS**
34	PCB holders	3.52	0.82	0.34	**Required, NS**
35	Spatula	3.77	0.84	0.21	**Required, NS**
36	SIM card cutters	3.75	0.87	0.25	**Required, NS**
37	Allen keys	3.58	0.85	0.53	**Required, NS**
38	Mobile openers	3.57	0.89	0.41	**Required, NS**
39	Digital battery testers	3.63	0.78	0.56	**Required, NS**
40	Volt stick	3.58	0.85	0.53	**Required, NS**
41	DC power source	3.53	0.89	0.41	**Required, NS**
42	Test light	3.63	0.78	0.56	**Required, NS**

43	Modern socket outlets for powering sensitive electrical/electronic equipment	3.78	0.81	0.09	**Required, NS**
44	Catalogues of various electronics and electrical equipment	3.68	0.79	0.52	**Required, NS**
45	Conducive classrooms for training	3.71	0.83	0.10	**Required, NS**

Keys: *S.D. = Standard Deviation, NS = Not significant, Ho = hypothesis, Sig. = significance*

Data in Table 3 revealed that 45 items had their mean values ranged from 3.52 to 3.86 and this shows that the mean value of each item was above the cut-off point of 3.50, indicating that all the 43 training facilities could be utilized for widening occupational opportunities of electrical/electronic technology graduates. Similarly, the standard deviation of contents of the training programme ranged from 0.71 to 0.89 indicating that the respondents were close to one another in their opinion. The Table 3 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of the respondents on the training facilities that could be utilized by trainers for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change. Therefore, the null hypothesis of no significant difference was upheld for all the 45 training facilities

Discussion of Findings

The findings of this study revealed 50 competencies (contents) for widening occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change, 58 instructional strategies for implementing the contents for widening the occupational opportunities of electrical/electronic technology graduates and 45 training facilities that could be utilized for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change. The contents of a training programme determine the quality of skills acquired by the trainees. The results of the study in Table 1 agreed with Giachino and Gallington (1977) that if content has no components of non – loading items, it is assumed that the factorial validity of the content is high. The finding also agreed with the opinion of Jain (2010) that the higher the absence of low loading items the more important and suitable the contents. The finding was in agreement with the opinion of Kapoma and Namusokwe (2011) that content is a list of subjects, skills, topics, themes, concepts or works to be

covered in a programme. Equipping teachers of technology such as technologists and instructors with necessary contents during retraining promotes skills acquisition among students; because these teachers are charged with the responsibility of equipping students with relevant skills and attitudes in occupational areas of technical education in schools and colleges

These findings agreed with the submission of Bakare (2010) who stated that innovations and 21st century technologies such as modern equipment, tools and machines should be integrated to the curriculum of electrical/electronic technology. These findings were in agreement with the findings of Ogbuanya and Bakare (2017) who that 22 competencies in e-teaching were appropriate for capacity building of technical education lecturers, 44 instructional strategies for implementing e-teaching contents for capacity building of technical education lecturers and 33 training facilities and procedures for building the capacity of technical education lecturers in e-teaching. The findings of this study agreed with the findings of Asogwa (2010) who conducted a study on development of entrepreneurial competency support programme in goat production for enhancing the income of teachers of agriculture in secondary in Enugu State and found that 11 competency items were required in planning for goat production, 17 in providing housing, 29 in breeding goat, 29 in rearing weaned goats, six in health management of goats, 10 in marketing of goats and 27 in packaging competency items in goat production enterprise into a competency based programme. This finding was also in agreement with the study of Akinduro (2006) who carried out a study on electrical installation and maintenance work skills needed by technical college's graduates to enhance their employability in Ondo State. The author found out that the graduates of technical colleges needed domestic installation skills, industrial installation skills, cable jointing skills, battery charging skills and winding skills in electrical machine for employment in Ondo State. The findings of this study agreed with the findings of Ogbuanya, and Bakare (2014) who conducted a study on mechatronics skills required for integration into electrical/electronic engineering technology programme in polytechnics for sustainable employment of graduates in contemporary Nigeria. The findings revealed that 16 mechatronicc contents and 40 mechatronics skills were required for integration into electrical/electronic engineering technology programme in polytechnics for sustainable employment of graduates. This finding was in agreement with the findings of Nwachukwu, Bakare and Jika (2011) who carried out a study to identify effective laboratory safety practice skills required by electrical and electronics students for effective functioning in the laboratory of technical colleges in Ekiti State. The authors found that 10 safety practice skills were required to use electrical hand tools, 25 safety

practice skills in operating electrical and electronic power tools and machines and 10 safety practice skills for working in electrical/electronic workshop.
The results of the study in Table 2 show that all the instructional strategies could be used for implementing the contents for widening occupational opportunities of electrical/electronic technology graduates. These findings agreed with the finding of Olelewe and Okwor (2017) that using ICT supported strategies for teaching improves learning outcome of students and make the teaching easier for teachers. The findings were in agreement with the finding of Onah (2013) who carried out a study on development of a digital empowerment programme for students on e-learning in the universities in southeast of Nigeria and found out that demonstration, cooperative learning, discussion and guided discovery are suitable as instructional strategies for teaching competence to students. Teaching strategies/ methods serve as medium in which teachers transfer their planned instruction to students. Also the finding were in consonance with the findings of Ogbuanya, Bakare and Igweh (2009) that teaching strategies such as reciprocal peer tutoring improve someone's competence in electrical/electronic and other related subjects when effectively applied during instruction

The results of the study in Table 3 show that all the training facilities could be used for implementing the contents for widening occupational opportunities of electrical/electronic technology graduates. These findings were are also in line with the finding of Adirika and Alike (2008) that technologies such as computer, relevant electronic equipment, internet facilities, email, cell phones, e-teaching facilities, Ipads among others are yet to be fully used for teaching of school subjects due to inadequate skill possessed by the lecturers.

Furthermore, the results of hypotheses one to three showed that there were no significant differences in the mean responses of lecturers and supervisors on the contents, instructional strategies and training facilities for implementing the contents for widening occupational opportunities of electrical/electronic technology graduates. This means that the lecturers and supervisors had similar perceptions on the contents, instructional facilities and training facilities for widening the occupational opportunities of electrical/electronic technology graduates in African environment to cope with world of change. That is, they have the same opinions on most of the items presented tables 1-3.

Conclusion

The essence of introducing electrical/electronic technology programme into the curriculum of Nigerian universities is to equip students with knowledge, skills, attitudes and techniques for paid or self employment. What we have in our society today is contrary to the objective or purpose of including electrical/electronic technology into the Nigerian university curriculum. The majority of graduates of electrical /electronic are jobless and observation reveals that most of these graduates lack competences or skills for paid employment or to take occupations within electrical/electronic technology. The researcher now carried out this study in order to widen the occupational opportunities for electrical/electronic technology graduates. Appropriate contents, instructional strategies and training facilities were therefore determined for widening the occupational opportunities of electrical/electronic technology graduates.

Recommendations

Based on the findings of this study, the researchers presented the following recommendations for consideration:

1. The contents determined in this study should integrated to the electrical/electronic technology programme of Nigerian universities for training of students
2. Relevant facilities and materials should be supplied by government and enabling individuals for effective implementation of the developed contents in electrical/electronic technology
3. Teachers should be encouraged to make use of the determined strategies for the implementation of the contents for widening occupational opportunities of electrical/electronic technology programme

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