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Assessment of Practical Skill Training of Technical College Students in Electrical and Electronics Trade in Osun State, Nigeria.

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Abstract

This study aimed to assess the practical skill training of Technical College students in Electrical and Electronics trades in Osun State of Nigeria. A survey research design was adopted for the study. The population consisted of 15 principals (Vice principals inclusive), 16 heads of electrical and electronics Department and 43 teachers, Technical Colleges of Osun State. The entire population was used. Six research questions and three null hypotheses were formulated based on the specific purpose of the study. The data for the study were collected by means of structured questionnaire developed by the researchers and validated by the three lecturers from the Department of Vocational Teachers Education, University of Nigeria, Nsukka. The reliability of the instrument was established by the use of Cronbach Alpha reliability index. The data collected were analysed using mean scores to answer the research questions while the three null hypotheses were tested using t-test at 0.05 level of significance. It was found that teachers were not adequate in terms of practical experience and numerical strength. Most of equipment/facilities were not put to effective use to train the students. Most of appropriate teaching methods for teaching Vocational Technical Education subjects were not used to teach the students in the Technical Colleges. The hours allocated for practical were inadequate. The method of evaluation of practical in Electrical and Electronics were very poor. On the bases of the findings, it was recommended among others, that equipment/facilities should be supplied to the electrical and electronics section of the technical colleges and adequate number of qualified teachers should be recruited to handle all the courses offered in electrical and electronic in the technical colleges.

INTRODUCTION

The economic development of any country is directly related to the quality of its available human resources. Gana (1988) stated that the nation's economic growth and its living standard are influenced by the size and quality of its human resources. Human resource productivity can only be enhanced through skills acquisition. In Nigeria, skills acquisition is hoped to be achieved through vocational education. Vocational education is any form of education whose primary purpose is to prepare individuals for employment in a recognized occupation (Okoro, 1993). It has as one of its major objectives to impact skills that will make the recipient self-reliant (Federal Ministry of Education [FME], 2004). Thus the individual will be better equipped for better productive living. The productive capacity of a nation's human resources is a measure of its health.

Electrical/Electronics is one of the vocational education trades in Nigeria technical colleges and is designed to meet the need of craftsmen that will repair, and service appliances such as cassette players, radio, television and other electrical wiring and appliances. It is very important that the technical colleges equip their students with the needed skills that will enable them meet the need of the society in repair and services of Electrical and Electronics goods. The students may also wish to take the opportunity to further their education in technical education (National Board for Technical Education (NBTE), 2001).

A national curriculum is adopted in all the technical colleges accredited by the NBTE. The programmes are offered at two levels of certification leading to the award of National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC) for craftsmen and master craftsmen. The curriculum for Electrical and Electronics in technical colleges cover the major area of Electrical and Electronics skills which include: cable joint and soldering, battery charging and maintenance, machine rewinding and installation, industrial installation, fault detection and rectification, others are electronics devices and circuits, radio and audio frequency amplifiers, radio system and television repairs and maintenance. Anadi (1989) pointed out that it is essential that technical colleges in the light of essence of their establishment should equip the students with skills related to their field of study for employment. Olaitan and Aguisiobo (1981) emphasized that any skill-oriented discipline where acquisition of skills and knowledge are needed requires an intensive exposure of students to practical work. Such practical experiences, according to Ezema (1998) contribute to a large extent to the understanding and utilization of what is learnt. Therefore, the teaching and learning activities in Electrical and

Electronics should sufficiently furnish the student with saleable work skills and competences that can lead to skill development and acquisition.

Skill, according to Okorie (2000) is referred to as expertness in practical ability, dexterity and tact. He explained that, to possess a skill is to demonstrate the habit of acting, thinking and behaving in a specific activity in such a way that the process becomes natural to the individual through repetition or practice. As a principle, vocational education will be effective in proportion as it trains the individual directly and specifically in the thinking habits and the manipulative habits required in the occupation itself (Okoro, 1993).

Practical skill training is a unique aspect of a technical college programme that can be defined as an act of doing, making, manipulating and practicing the theoretical knowledge gained with the uses of materials, tools and equipment. As craftsmen and technicians pass through technical college programmes it is expected that such programme should equip them to function well in the society. The NBTE (1987) stresses that the ultimate goal of the programme offered in the technical college is to enable trainees perform all the skills and show a good knowledge of the theoretical concepts of the trade as specified in training modules before they are certified. However, Chris (1998) noted that most of these skills are not being acquired by technical college graduates. He explained that students in technical colleges have often not been given the skills they actually needed. As a result of this, a fresh graduate when confronted with electrical and electronics problems would be at a loss on how to correlate what he learned and what is required in practice. Such graduates find it difficult to become self-reliant in the face of unemployment in the country.

Electrical and electronics are the nerve centre of the economy of Osun State because almost all industrial and commercial establishments require one form or the other of electricity for effective production. The field of electrical and electronics technology is readily expanding and modern technology is bringing new electronics product such as Global System of Mobile Communication (G.S.M) Video Compact Disk (VCD), computer etc for craftsmen and technicians be equipped with the required skills for quality services. Contrary to expectation, many are unable to do so. Anadi (1989) stated that the graduates will contribute effectively to the achievement of self-reliance goal in proportion as they are adequately equipped skill. Wenrich and Wenrich (1984) pointed out that vocational institutions exist solely to serve the needs of students in developing occupational skills which will make them employable. He stressed that every vocational educator should be concerned about how vocational institutions can provide relevant service to students. Enemali (1992) stated that there is need to make vocational institutions respond to the valid need of the youths and society.

Every year technical colleges produce graduates who cannot perform creditably in their education or take up employment especially in electrical and electronic trades. This has serious economic and social implications. Since skills acquisition depend on the skill straining given to students, it is then very necessary to assess the training given to students of technical colleges in Osun State, especially in the aspect of electrical and electronics practical. This study is therefore aimed at assessing the practical skills training given to students of electrical and electronics in the technical colleges.

Statement of the problems

Electrical/electronics trade is one of the vocational education trades which its objective is to produce craftsmen that will maintain, service and repair electronics appliances such as cassette players, radio, television among others and to do wiring and installation. National policy on education (NPE) (2004) stated that technical education in which electrical and electronics trades is, is a form of education through which practical technical skills is to be acquired as well as basic scientific knowledge that will enable individuals to be enterprising, self-reliant or self-employed and useful members of the society. However, it is a surprise that the plight of technical college graduates in the country is inability to gain employment after graduation (Effiong, 1996). He further stated that employers of labour feel reluctant to employ fresh graduate from technical colleges especially in electrical and electronics trades. According to Effiong the complaint by the employers of labour is that the graduates cannot perform up to expectation. Consequently there is high rate of unemployment among electrical and electronics graduates of the technical colleges, especially in Osun State where graduates are roaming the streets.

In the technical colleges, the main emphasis for those specialization in electrical and electronics trades is the acquisition of skill required for wiring, repair, maintenance, design and construction of electrical appliances. Ability to do all these does not require any thing other than manipulative skills and manual dexterity all achievement through practical skills.

Oke (1998) stated that a sound vocational education system should have adequate practical skill, which is extremely necessary in producing graduates who can face the developmental challenges of the nation. On contrary, the products of technical colleges are known to be very good in the theoretical aspects of their training while very poor in the practical aspect. Due to this situation, the product cannot help themselves out of the frustration of unemployment in Nigeria today. This study is therefore designed to assess the practical skill training offered to students of technical colleges in Osun State.

Research Questions

The following research questions will be answered by the study:

1. How qualified/adequate and experienced are the teachers of the electrical and electronics sections of the technical colleges?
2. How available and adequate are the training equipment in electrical and electronics section of the colleges?
3. To what extent are the facilities put to effective use of training the students?
4. What are the teaching methods used in teaching electrical and electronics trade practical, to students in the technical colleges?
5. How adequate is the time allocated for the practical lessons?
6. How is practical in electrical and electronics evaluated in technical colleges?

Hypotheses

The following hypotheses will be tested at 0.05 level of significance.

1. There is no significant difference in the mean opinion of qualified and less qualified teachers on the extent of facility usage.
2. There is no significant difference between the mean opinion of the technical college administrator and teachers on availability and adequacy of the training equipment/facilities.
3. There is no significant difference between the mean opinion of experienced and less experienced technical college teachers on teaching methods used in practical lessons in technical college.

METHOD

Design of the study

The study adopted a survey research design because according to Osuala (2001) a survey research design focuses on people, their opinions, attitudes, motivations and behaviour. It is suitable for the study since relevant information on practical skill training of technical colleges students in electrical and electronic department of electrical and electronics trade of the technical colleges in Osun State.

Area of the Study

The study was carried out in all eight technical colleges of Osun state offering electrical and electronics trades, because it was possible for the research to have assess to the institutions involved within the state for relevant information.

Population of the study

The population for this study was made of three groups: Group A comprised the principal and vice-principals in the eight technical college in Osun State. The number of subjects in this group was sixteen.

Group B consisted of all head of installation and maintenance (Electrical) department as well as radio and television (RTV) electronics department in all eight technical colleges of Osun State. The number of subjects in this group was sixteen.

Group C was made of all teachers in electrical and electronics trade in all the eight technical colleges of Osun State. The number of subjects in this group was forty-four.

Since the population is not too large the entire population was used in the study. The distribution of the principals, vice-principals heads of department and teachers of electrical and electronics is presented in Table 1.

Table 1: Distribution of technical college principals, vice-principals, heads of department and teachers of electrical and electronics trades

S/N	Name of technical colleges	Number of principal & vice principal	Number of H.O.D.	Number of teachers
1.	Government technical college Ife	2	2	6
2.	Government technical college Osogbo	2	2	8
3.	Government technical college Abongan	2	2	4
4	Government technical college Osu	2	2	5
5.	Government technical college Ijebu-jesa	2	2	6
6.	Government technical college Iwo	2	2	6
7.	Government technical college Ara	2	2	5
8	Government technical college Inisha	2	2	4
	Total	16	16	44

H.O.D = Head of Department

Instrument for Data Collection

A questionnaire was used for data collection in this study. The instrument was structured and organized base on the research questions for the study.

The questionnaire was administered on the principals, vice-principals, teachers of electrical and electronics, as well as head of department in electrical and electronics trades; it had six section (A – F). Section A solicited information for research question one on qualified/adequacy and experience of teachers in electrical and electronics section of the technical colleges.

Section B sought information for research question two on availability and adequacy of the training equipment facilities in electrical and electronics of the colleges, while section C was to verify research question three – the extent to which the facilities have been put to effective used. Section D was to elicit information from the respondents for research question four – te teaching methods used in the technical colleges, section E solicited information for research question give – adequacy of the time allocated for practical lessons, and section F sought information from the respondents on research question six – how is the practical in electrical and electronics evaluated in the technical colleges.

The instruments contained a total of 104 items and all the items were common to the principals/vice principals, heads of the department and teachers of electrical and electronics. The responses to the items in research question one (section A) were based on frequency and percentage scales while the responses to the items in other research questions (Section B – F) were based on a five – point Likert scale. There are two modes of responses to each items in section B and responses categories in this section were "much available" (MA) = 5, "aavailable" (AV) =, "fairly available" (FA) = 3 "not available" (NA) = 2, very unavailable (VU) = 1. Very adequate (VA) = 5, adequate (A) = 4, fairly adequate (FA) = 3, not adequate (NA) = 2, very inadequate (VI) = 1. The categories of response for section C were strongly agree (SA) = 5 "agree" (A) = 4, "unable to tell" (U) = 3, "disagree" (D) = 2, "strongly disagree" (SA) = 1. Section D used response categories of "very great extent" (VGE) = 5, "great extent" (GE) = 4, "moderate extent" (ME)= 3, "low extent" (LE) =2, very low extents" (VLE) = 1 and responses to items in section E and F were "very adequate" (VA) = 5 "adequate" (A) = 4 fairly adequate (FA) = 3 inadequate (IA) = 2 very inadequate (VI) = 1.

Validation of the Instrument

To establish the face validity of the instrument, the questionnaire were submitted to three lecturers in the Department of Vocational Teacher Education, University of Nigeria, Nsukka. They were requested to check the language for ambiguity, relevance of each item and suitability to purpose. Based on their comments, five items were modified while no item was dropped.

Reliability of the Instrument

The reliability of the instrument was established by the use of Cronbach Alpha (α) reliability index to determined the internal consistency of the items. The choice of Cronbach Alpha reliability is based on the fact that: the questionnaire are multiple response type. It provides for a more stable measure of homogeneity (Uzoagulu, 1998).

Method of Data Collection

The researchers and two research assistants administered the questionnaire through personal contact with the respondents. A total of seventy six copies of questionnaires were administered to the respondents as follows: principals/vice principals 16, head of department 16, and teachers of electrical and electronics 44. Retrieved copies of the questionnaire were as follows principals/vice principals 15 representing 93.75% return rate. Head of department 16, representing 100% return rate and teachers of electrical and electronics 42 representing 95.45%. The return rate of 96.4% were achieved.

Method of Data Analysis

The data collected for research question one (Section A) was analyzed using frequency and percentage mode, any item equal or above 50% was considered positive and any items below 50% are considered negative. The data collected were analyzed using mean and standard deviation to answer the five research questions. The lower and upper limit of the mean were 2.50 and 3.50 respectively with an internal scale of 0.05 from the mean. As basis for decision, any item of the research questions equal or above 3.50 were considered positive, while any item with the mean of less than 3.50 were considered negative. Therefore, the cut-off point of the research questions was 3.50.

However, each of the three hypotheses were tested using t-test statistics at significance level 0.05. The calculated-t were compared with table-t, if the calculated t-value was equal or greater than table-t value the null hypothesis were rejected at 0.05 level of probability otherwise the null hypotheses were accepted at 0.05 level of significance at appropriate degree of freedom.

RESULTS

Research Question 1

How qualified, adequate and experience are the teachers of the electrical and electronics of the technical colleges?

The level of teachers in the electrical and electronic section of technical colleges.

Table 2: Year of Experience on the Post

	Year of teaching experience	Frequency (f)	Percentages (%)
1.	1 – 3 years of teaching experience	21	28377
2.	4 years and above of teaching experience	52	71.23
	Total	**73**	**100.00**

Table 3: Academic Qualification of teachers

	Qualification of teachers	Frequency (f)	Percentages (%)
3.	Advanced National Technical Certificate (ANTC)	2	2.74
4.	Ordinary National Diploma OND	3	4.11
5	National Certificate of Education Technical (NCE. Tech)	10	13.70
6	Higher National Diploma (HND)	38	52.06
7	Bachelor of Science Degree (B.Sc.)	15	27.40
8	Bachelor of Science in Technical Education (B.Sc. Tech. Edu)	5	10.96
	Total	73	100.00

Table 4: Adequacy of the number of electrical and electronics teachers

	Adequacy of teachers to handle electrical and electronics practical	Frequency (f)	Percentages (%)
9	Adequate	25	34.25
10	Inadequate	48	65.75
	Total	73	100.00

In table 2 above, the teachers that worked for 4 years and above were considered as experienced teacher while those who worked below 4 years were considered less experienced. The table 2 above shows that the teachers in electrical and electronics trades had enough years of teaching experience as indicated by their frequency and percentage mode of 71.23 of the entire population of teachers

Table 3 above revealed that there were not enough qualified teachers to teach the students in electrical and electronics in the technical colleges as indicated by their frequency and percentage in the table 3 above, only N.C.E. technical and B.Sc Technical Education were considered qualified teachers and their percentage were 13.70 and 10.96 respectively. Putting the two together, the percentage was 24.66 of the entire population of teachers. By this it shows that there were not enough qualified teachers in the technical colleges in Osun State.

Table 4 above indicated that there was inadequate number of teachers to handle electrical and electronics practical. The percentage of teachers that agree with inadequate number of teachers are 65.75% of the entire population.

Research Question 2

How available and adequate are the training equipment/facilities in electrical and electronics.

Table 5: Availability and adequacy of training equipment/facilities

s/n	Electrical Equipment/facilities	Available					Adequacy				
		Principal & vice principal N = 15 H.O.D. N = 8 $\bar{x}$	Teachers N = 20 $\bar{x}$	Grand mean	Remark		Principal & vice principal N = 15 H.O.D. N = 8 $\bar{x}$	Teachers N = 20 $\bar{x}$	Grand mean	Remark	
11	Standard workshop with sufficient work section	2.93	2.75	2.55	2.74	Not available	2.53	2.40	2.25	2.39	Not adequate
12	Storage facilities	3.33	3.01	2.25	2.86	Not available	2.53	2.62	2.35	2.50	Not adequate
13	Work benches	2.80	3.13	2.85	2.93	Not available	3.13	2.00	2.55	2.56	Not adequate
14	Bench vice	3.53	3.62	3.95	3.70	Available	3.33	3.13	2.55	2.67	Adequate
15	Bench winding machines	2.93	2.75	2.65	2.78	Not available	1.87	2.13	1.95	1.98	Not adequate
16	Drilling machines	3.53	3.62	3.75	3.63	Available	3.66	2.13	2.90	2.89	Not adequate
17	Grinding machines	3.00	3.25	3.15	3.13	Not available	296	1.87	1.80	2.20	Not adequate
18	Electric motors	2.66	2.50	1.95	2.37	Not available	2.46	1.12	1.80	1.79	Not adequate
19	Hacks saws	4.26	3.62	3.50	3.79	Available	2.08	2.25	2.22	2.18	Not adequate
20	Hand sheaves	2.26	2.12	2.20	2.19	Not available	2.33	2.50	1.90	2.24	Not adequate
21	Illumination wires	4.80	4.75	3.35	4.30	Available	4.73	4.50	3.95	4.39	Adequate
22	Hammer	4.26	3.87	3.55	3.89	Available	4.40	3.75	3.80	3.98	Adequate
23	Sets of screw-driver	4.40	3.87	3.90	4.06	Available	3.67	3.25	3.10	3.34	Inadequate
24	Pair of pliers	3.06	3.63	2.95	3.21	Not available	2.47	2.37	2.25	2.36	Not adequate
	Grant mean ($\bar{x}$) electronics equipment/facilities	3.41	3.32	3.04	3.26		2.94	2.57	2.53	2.68	Not adequate
25	Soldering irons	2.53	1.87	1.85	208	Not available	2.00	1.75	1.70	1.82	Not adequate
26	Soldering lead	1.87	1.88	1.85	187	Not available	1.93	1.63	1.60	172	Not adequate
27	Vero boards	2.06	1.75	1.75	1.85	Not available	2.06	1.88	1.55	1.83	Not adequate
28	Printed circuits	2.40	2.50	1.90	2.26	Not available	2.47	1.25	1.80	1.84	Not adequate
29	Oscilloscope	2.86	1.75	2.10	2.49	Not available	2.40	1.88	175	2.01	Not adequate
30	Power supply units	2.47	1.25	1.25	1.82	Not available	1.80	2.50	1.90	2.07	Not adequate
31	Electronics components	2.53	2.20	2.20	2.43	Not available	1.66	1.63	1.95	1.75	Not adequate
32	Electric wires	3.00	3.50	3.05	3.18	Not available	2.00	1.63	1.70	1.78	Not adequate
33	Electric accessories	2.80	2.50	1.90	2.40	Not available	3.33	3.25	3.05	3.21	Not adequate
34	Drilling machines	2.53	2.87	2.10	2.50	Not available	3.07	2.88	2.15	2.70	Not adequate
35	Multi-meters	2.47	1.75	1.20	1.81	Not available	1.93	1.63	1.60	1.72	Not adequate
36	Flux	2.60	2.75	2.35	2.56	Not available	2.66	1.88	2.40	2.31	Not adequate
37	Measuring instruments	2.60	3.12	1.95	2.56	Not available	1.73	3.75	2.45	2.64	Not adequate
38	Setoff screw-drivers	3.86	4.38	3.80	401	Available	4.06	4.00	3.80	3.95	Adequate
39	Pair of pliers	3.53	3.75	3.75	3.67	Available	2.87	1.88	2.25	2.33	Adequate
	Grand mean ($\bar{x}$)	2.67	2.64	2.2	2.50		2.40	2.23	2.11	2.25	Not adequate

Table 5 shows that great number of items of training equipment/facilities in electrical section were not available and inadequate. Items that were not available and inadequate were standard workshop storage facilities, work benches, bench winding machines, grinding machines, electric motors, and hand shears. This indicated by the overall means of each items in both availability and adequacy, were less than 3.50. The items that were available but not adequate were bench vice,

drilling machine, hack saws and set of crew-drivers as indicated by their overall means which is greater than 3.50 and less than 3.50 respectively. The illumination wires and hammer were available and adequate, their overall means were greater than 3.50.

In electronics section, most of the training equipment/facilities were not available and inadequate s shown by their overall item that less than 3.5. The items were soldering iron, soldering lead, vero boards, printed circuits, oscilloscope power supply units, electronics components, electric wires, electric accessories drilling machines, multi-meters, flux and measuring instruments. Set of screw-drivers and pair of pliers were available and adequate as shown by their means above 3.5

Research Question 3

What are the teaching methods used in teaching electrical and electronics trade practical, to students in the technical colleges?

Table 6: Teaching methods used in teaching electrical and electronics students in technical colleges.

	Items	Principal & vice principal N = 15 $\bar{x}$	H.O.D N = 16 $\bar{x}$	Teacher N = 12 $\bar{x}$	Grand mean $\bar{x}$	Remark
40	Questioning method	3.93	3.93	3.88	3.91	Used
41	Assignment method	3.60	3.56	2.95	3.70	Used
42	Demonstration method	1.86	1.94	1.88	1.89	Not used
43	Project method	3.45	2.93	2.95	3.11	Not used
44	Experiment method	2.33	2.06	2.21	2.20	Not used
45	Field trips method	2.93	2.68	3.69	3.10	Not used
46	Lecture method	3.87	3.50	4.30	3.89	Not used
47	Practice and drill method	1.93	1.94	2.98	2.28	Used
48	Discovery method	2.13	2.56	3.17	2.62	Not used
49	Inquiry and problem solving	1.80	1.94	2.43	2.06	Not used
50	Role-playing, game and simulation	2.13	3.06	2.90	2.70	Not used
51	Individualized instruction	3.20	3.53	2.64	3.12	Not used
52	Programmed instruction	3.33	2.56	3.17	3.02	Not used
53	System approach instruction	2.47	2.81	1.45	2.21	Not used
54	Metal learning	1.73	2.38	2.90	2.34	Not used
55	E-learning	1.67	2.00	1.69	1.79	Not used
56	Concept mapping	2.00	2.63	1.81	2.15	Not used
57	Monitoring	1.67	1.88	2.21	1.92	Not used
58	Coaching	3.06	2.97	2.16	2.73	Not used
59	Cognitive apprenticeship	2.40	2.75	1.93	2.36	Not used
	Grand mean ($\bar{x}$)	2.58	2.68	2.72	2.66	Not used

Table 6 above shows that not all the teaching methods which are appropriate for teaching practical oriented courses were used in teaching students in technical colleges in Osun State. The methods not used were demonstration method, project, experiment, field trips, practice and drill, discovery method, inquiry and problem solving, role-playing, game and simulation, individualized instruction, programmed instruction, system approach, meta-learning, coaching and cognitive apprenticeship as indicated by their overall mean of 1.89, 3.11, 2.20, 3.10, 2.28, 2.62, 2.06, 2.70, 3.12, 3.02, 2.24, 2.34, 1.78, 2.15, 1.92, 2.73, and 2.36 respectively. The worst affected of all the methods was e-learning. The methods that were used are questioning assignment and lecture methods as indicated by their overall means of 3.91, 3.70 and 3.89 respectively.

Research Question 4

To what extent are the facilities put to effective use for training the students?

Table 7: The extent to which the facilities are put to effective use to train the students

	Items	Principal & vice principal N = 15 $\bar{x}$	H.O.D N = 16 $\bar{x}$	Teacher N = 12 $\bar{x}$	Grand mean $\bar{x}$	Remark
60	Standard workshop with sufficient work stations	2.93	2.81	3.30	3.01	Not effective used
61	Storage faculties	2.53	2.68	2.20	2.47	Not effective used
62	Work benches	2.46	1.88	2.35	2.23	Not effective used
63	Bench vice	1.93	2.00	1.55	1.83	Not effective used
64	Bench winding machine	1.60	1.94	1.65	1.73	Not effective used
65	Drilling machine	1.80	2.56	1.90	2.09	Not effective used
66	Grinding machine	3.20	2.38	2.70	2.76	Not effective used
67	Electric motors	2.93	3.00	2.10	2.68	Not effective used
68	Hack saws	2.13	1.95	2.80	2.29	Not effective used
69	Hand shears	2.13	2.94	3.05	2.71	Not effective used
70	Hammers	3.80	3.90	3.55	3.75	Not effective used
71	Illumination wires	2.33	3.00	3.00	2.78	Effectively used
72	Set of screwdriver	3.80	4.00	3.90	3.90	Effectively used
73	Pairs of pliers	3.73	3.56	3.75	3.68	Effectively used
	Grand mean ($\bar{x}$)	2.66	2.78	2.70	2.71	Not effective used
	Electronics equipment/facilities					
74	Soldering irons	2.27	1.75	3.00	2.34	Not effective used
75	Soldering lead	2.80	2.38	2.18	2.45	Not effective used
76	Vero boards	1.67	1.88	2.11	1.92	Not effective used
77	Printed circuits	2.60	2.13	1.86	2.20	Not effective used
78	Oscilloscope	2.73	2.75	2.41	2.63	Not effective used
79	Power supply units	3.00	2.50	3.41	2.97	Not effective used
80	Electronic components	1.73	2.38	2.91	2.34	Not effective used
81	Electric wires	2.53	3.38	2.95	2.95	Not effective used
82	Electric accessories	3.00	3.00	2.36	2.79	Not effective used
83	Drilling machines	2.00	3.25	3.00	2.75	Not effective used
84	Multi-meters	2.67	2.00	3.14	2.60	Not effective used
85	Set of screwdriver	4.07	3.88	3.95	3.97	Effectively used
86	Pair of pliers	407	3.75	4.05	3.96	Effectively used
	Grand mean ($\bar{x}$)	2.70	2.69	2.88	2.76	Not effective used

The data in table 7 show that most of the available equipment/facilities in electrical and electronic section were not put to effectively used to train the students. The storage facilities, work bench, bench vice, bench winding machines, drilling machines, grinding machines electric motors, hack saws, hand shears, illumination wires, soldering irons, soldering lead, vero boards printed circuits, oscilloscope, power supply units electronic components, electric wires, electric accessories, drilling machines and multi-meters. This is evident by the overall means of each of the items being below 3.50. Equipment/facilities that were put to effectively used were hammers, set of screwdrivers and pairs of pliers, as shown by their overall means, which is above 3.50.

Research Question 5

How adequate is the time allocated for the practical lessons?

Table 8 above shows that the time allocated for practical lesson in electrical and electronics as were not adequate indicated by their overall means score that were below 3.50. The affected practical lesson were the use of multi-meters, repair and recoiling of electric motors, repair of generators, conduit wiring repair of transformers, television repair and maintenance, design and construction of frequency modulation radio (FM), repair of amplifier and general servicing of electrical/electronics goods; their overall means were 2.10, 2.77, 3.25, 3.13, 2.38, 2.81, 2.87 and 3.30 respectively.

Adequate items were allocated to surface wiring, and repair of radio and maintenance as indicated by their overall means of 3.88 and 3.69 respectively.

Table 8: Adequacy of time allocated for the practical lessons

	Items	Principal & vice principal N = 15 $\bar{x}$	H.O.D N = 16 $\bar{x}$	Teacher N = 12 $\bar{x}$	Grand mean $\bar{x}$	Remark
87	Use of multi-meters	2.13	2.13	2.04	2.10	Not adequate
88	Repair and recoiling of electric motors	2.67	2.75	3.90	2.77	Not adequate
89	Repair of generators	3.27	3.25	3.34	3.29	Not adequate
90	Surface wiring	3.93	3.94	3.76	3.88	Not adequate
91	Conduit wiring	3.07	3.31	300	3.13	Not adequate
92	Repair of transformers	2.93	3.50	2.95	3.13	Not adequate
93	Radio repairs and maintenance	3.93	3.56	3.57	3.69	Not adequate
94	Television repairs and maintenance	1.93	2.44	2.76	2.38	Not adequate
95	Design and construction of frequency modulation radio (FM)	3.27	2.63	2.52	2.81	Not adequate
96	Repair of amplifier	3.33	2.69	2.60	3.87	Not adequate
97	General servicing of electrical/electronics goods	3.47	3.25	3.19	3.30	Not adequate
	Grand mean ($\bar{x}$)	2.61	2.57	2.51	2.56	Not adequate

Table 9: Evaluation of practical lesson in electrical and electronics in the college or department/sections

	Evaluation methods	Principal & vice principal N = 15 $\bar{x}$	H.O.D N = 16 $\bar{x}$	Teacher N = 12 $\bar{x}$	Grand mean $\bar{x}$	Remark
98	Performance testing	2.33	2.25	2.19	2.26	Not adequate
99	Product evaluation	3.13	3.25	3.19	3.19	Not adequate
100	Process evaluation	2.47	2.38	2.10	2.32	Not adequate
101	Ranking method	2.73	2.13	2.05	2.30	Not adequate
102	Checklist method	4.13	4.25	4.19	4.19	Not adequate
103	Rating scale	127	1.38	1.31	1.32	Adequate
	Grand mean ($\bar{x}$)	2.68	2.61	2.51	2.60	Not adequate

Research Question 6

How is the practical in electrical and electronics evaluated in your technical college or department/section.

Table 9 above shows that most of the evaluation method adopted for practical lessons were not adequately used as indicated by their overall mean score that were below 3.50. The affected evaluation method were performance testing, product evaluation, process evaluations method, ranking method and rating scale. Their mean score were 2.26, 3.19, 2.32, 2.30 and 1.32 respectively. Only checklist method of evaluation was adequately used for practical class. As indicated by the overall means of 4.19 in table.

Hypothesis 1

There is no significant difference between the mean opinion of qualified and less qualified teachers on the extent usage of the equipment/facilities.

The qualified teachers were those that possess teaching qualification such as B.Sc (Tech. Ed) and N.C.E. in technical education, while less qualified teacher are those that has no teaching qualification such as B.Sc., OND, HND, and ANTC.

Table 10: t-test analysis on the mean opinion of qualified and less qualified teachers on the extent of equipment/facilities usage.

		Qualified teachers N=41		**Less qualified teacher N = 32**			
		$\bar{x}_1$	**SD₁**	$\bar{x}_2$	**SD₂**	**t-cal**	
60	Standard workshop with sufficient work section	2.78	1.12	2.56	0.86	0.89	NS
61	Storage facilities	2.93	1.07	2.71	0.97	0.92	NS
62	Work benches	3.07	1.02	2.88	1.22	0.71	NS
63	Bench vice	3.17	1.25	2.96	0.90	0.93	NS
64	Bench winding machines	2.83	0.86	2.53	0.83	1.51	NS
65	Drilling machines	2.04	0.71	1.97	0.55	0.47	NS
66	Grinding machines	2.17	0.58	1.84	1.19	1.44	NS
67	Electric motors	1.95	0.34	1.81	0.61	1.16	NS
68	Hacks saws	1.60	0.42	1.28	0.41	0.20	NS
69	Hand shears	3.85	089	3.53	1.10	1.34	NS
70	Hammer	2.02	0.59	1.83	1.04	0.92	NS
71	Illumination wires	3.90	1.07	3.78	0.97	0.50	NS
72	Sets of screw-driver	2.44	0.86	2.08	0.94	1.69	S
73	Pair of pliers	3.90	1.06	3.55	1.19	1.68	S
74	Soldering irons	2.90	1.15	1.97	0.57	-0.35	NS
75	Soldering lead	2.80	0.99	2.69	0.43	0.64	NS
76	Vero boards	2.06	0.94	1.94	0.80	039	NS
77	Printed circuits	2.05	0.87	188	0.23	1.3	NS
78	Oscilloscope	2.06	0.76	1.94	0.99	0.56	NS
79	Power supply units	3.17	1.09	2.69	1.26	0.75	NS
80	Electronics components	3.46	1.01	3.34	1.30	0.38	NS
81	Electric wires	3.39	1.35	3.47	1.03	028	NS
82	Electric accessories	2.05	0.64	1.98	0.58	0.68	NS
83	Drilling machines	1.59	0.91	1.41	0.87	0.86	NS
84	Multi-meters	1.68	0.96	1.55	0.93	0.63	NS
85	Flux	1.54	1.02	2.77	1.09	-4.89	NS
86	Set of screwdrivers	3.83	0.95	3.45	0.83	1.82	S
87	Pair of pliers	3.85	0.75	3.51	0.71	1.75	S
	Grand mean ($\bar{x}$)	2.57	0.85	2.30	0.83	1.31	NS

N = number of respondent in the groups = (73); $\bar{x}_1$ = Mean of group 1
SD₁ = standard of deviation of group 1; $\bar{x}_2$ = Mean of group 2
SD₂ = standard deviation of group 2 t = calculated = 1.31
t = table value = 1.66 at 0.05 level of significant ce S = significant
NS = Not significant

The t-test analysis in table 9 above shows that there is no significant difference in themean rating of the qualified and less qualified teachers on the extent of facilities use in training the students. This is indicated by the overall calculated t-value of the items that was lower than the table t-value of 1.66 at 0.05 level of significance.

Hypotheses 12

There is not significant difference between the mean opinion of the college administrators and teachers on availability and adequacy of the training equipment/facilities.

The college administrators were principals, vice principals and heads of the department.

Table 10: t-test analysis on the mean responses on the availability and adequacy of training facilities.

	Availability of training equipment/facilities						Adequacy of training equipment/facilities					
	Administrator N = 31		Teachers N = 42				Administrator N=31		Teachers N=42			
	$\bar{x}_1$	SD_1	$\bar{x}_2$	SD_2	t-cal	Remark	$\bar{x}_1$	SD_1	$\bar{x}_2$	SD_2	t-cal	Remark
Standard workshop with sufficient work section	2.78	1.12	1.50	0.79	1.19	S	2.69	1.46	2.54	0.86	051	NS
Storage facilities	2.89	0.99	2.63	0.95	1.13	S	2.87	0.88	2.69	0.89	0.16	NS
Work benches	2.99	0.87	2.85	1.19	058	NS	2.08	0.91	2.85	0.85	-0.81	NS
Bench vice	3.00	1.21	3.44	0.89	1.83	NS	3.17	0.76	3.00	0.91	0.87	NS
Bench winding machines	2.79	082	2.51	0.80	1.46	NS	2.86	0.86	2.54	0.83	0.60	NS
Drilling machines	2.40	0.70	2.96	1.29	-2.38	NS	2.43	0.71	1.95	1.55	0.30	NS
Grinding machines	2.16	0.58	2.00	1.18	0.88	NS	2.17	0.98	2.01	0.79	0.75	NS
Electric motors	1.25	0.55	1.19	0.60	0.44	NS	2.13	0.99	1.81	1.61	1.05	NS
Hacks saws	1.28	0.53	2.45	1.19	-5.66	NS	2.68	0.59	2.50	0.85	1.06	NS
Hand shears	2.97	1.01	2.80	1.09	1.01	NS	3.86	0.89	3.79	0.90	0.33	NS
Illumination wires	2.21	0.69	1.99	1.01	1.11	NS	2.18	0.99	2.08	0.74	-0.47	NS
Hammer	3.85	1.66	3.55	0.56	2.04	NS	3.81	0.66	3.78	0.97	0.21	NS
Sets of screw-driver	3.99	0.71	3.68	0.66	1.91	NS	4.04	0.88	3.80	0.56	1.96	S
Pair of pliers	3.24	1.66	3.65	0.99	0.98	NS	3.35	0.66	3.24	0.89	0.63	NS
Soldering irons	3.06	1.02	2.90	0.57	0.79	NS	3.65	0.61	3.57	0.57	0.54	NS
Soldering lead	2.96	0.93	2.87	0.43	0.56	NS	2.97	0.86	2.78	0.83	0.93	NS
Vero boards	2.78	0.97	2.96	0.47	095	NS	2.81	0.99	2.75	0.87	0.27	NS
Printed circuits	2.18	0.78	1.88	1.20	1.29	NS	2.48	1.07	2.89	0.81	-0.27	NS
Oscilloscope	2.05	0.69	1.89	1.25	0.74	NS	2.04	0.57	1.95	1.23	0.33	NS
Power supply units	2.53	0.71	1.67	0.91	0.74	NS	2.55	0.72	2.69	0.99	-0.45	NS
Electronics components	3.28	1.08	2.21	1.21	0.22	NS	3.18	0.62	3.33	0.26	0.93	NS
Electric wires	3.20	1.00	1.99	1.29	1.16	NS	305	0.66	2.96	0.80	0.53	NS
Electric accessories	3.31	1.34	2.01	1.02	1.04	NS	3.73	0.71	3.52	0.63	1.31	NS
Drilling machines	2.03	0.65	1.77	0.88	1.45	NS	1.70	1.07	1.79	1.09	0.98	NS
Multi-meters	1.60	0.71	1.95	0.57	-2.26	NS	1.80	1.05	1.55	1.08	0.46	NS
Flux	1.70	0.72	2.05	0.55	-2.26	NS	1.70	1.02	1.62	1.05	0.74	NS
Measuring instruments	1.81	0.75	2.54	0.82	-3.95	NS	-2.83	0.78	2.54	0.83	1.53	NS
Setoff screw-drivers	3.93	0.55	3.63	0.60	2.22	S	3.93	0.65	3.59	0.64	2.22	NS
Pair of pliers	3.85	0.66	3.55	0.56	2.04	S	3.89	0.68	3.53	0.69	2.27	S
Grand mean ($\bar{x}$) and standard deviation (SD)	2.69	0.82	2.52	0.88	1.35	NS	2.69	0.86	2.43	0.80	1.32	NS

t-calculated value of availability and adequacy are 1.35 and 1.32 respectively at t-table value of 1.66 at 0.05 level of significance.

The t-test analysis in table 11 indicates that there is no significant difference between the college administrators and teachers on availability and adequacy of the training

equipment/facilities. This is indicated by the overall calculated t-value of the items that were lower than the table t-value of 1.6 at 0.05 level of significance.

Hypothesis 3

There is no significant difference between the mean opinion of experienced and less experienced technical college teachers on teaching methods used in practical lessons in the technical college.

Experienced teachers are those who has four years and above working experienced while less experience teachers are those who has working experienced below four years.

Table 12; t-test analysis on the mean responses for the teaching method used in practical lessons

		Qualified teachers N=43		Less qualified teacher N = 30			
		$\bar{x}_1$	SD₁	$\bar{x}_2$	SD₂	t-cal	Remark
34	Questioning method	3.95	140	3.45	0.96	1.81	S
35	Assignment method	3.90	1.10	3.50	0.87	1.73	S
36	Demonstration method	2.33	0.72	2.03	0.69	0.78	NS
37	Project method	1.63	0.42	1.77	0.53	-2.27	NS
38	Experiment method	2.09	0.72	1.97	0.79	0.66	NS
39	Field trips method	3.02	064	2.90	0.62	0.80	NS
40	Lecture method	3.92	1.33	3.42	108	1.70	S
41	Practice and drill method	1.86	0.68	1.73	0.74	0.76	NS
42	Discovery method	2.53	0.80	2.77	059	-1.48	NS
43	Inquiry and problem solving	3.26	0.96	3.37	0.88	1.03	NS
44	Role-playing, game and simulation	2.14	0.72	2.93	082	-4.26	NS
45	Individualized instruction	180	0.65	1.63	0.71	1.04	NS
46	Programmed instruction	2.95	0.84	2.80	0.60	0.89	NS
47	System approach instruction	1.91	0.1	1.83	0.55	0.54	NS
48	Metal learning	1.99	0.86	1.83	0.73	0.85	NS
49	E-learning	2.10	0.82	1.97	0.89	0.80	NS
50	Concept mapping	1.84	0.68	1.73	0.74	0.65	NS
51	Monitoring	1.88	0.69	1.73	0.74	0.88	NS
52	Coaching	1.74	058	1.5	0.63	1.17	NS
53	Cognitive apprenticeship	1.77	0.62	1.90	0.76	0.77	NS
	Grand mean ($\bar{x}$)	2.49	0.81	2.25	0.62	1.43	NS

The t-test analysis in table 12 above shows that there is no significant difference between the mean opinion of the experience teachers and less experienced teachers on teaching methods used in the technical college. This indicated by overall calculated t-value of 1.43, which is less than the t-table of 1.66 at 0.05 level of significance.

DISCUSSION

The findings of this study have revealed that teacher in the technical colleges were not adequate in term of qualification and numerical strength to handle all the practical lessons. This development was not in consonance with Udo (1997) who

stressed the need for adequate staffing of educational institutions, if qualitative education were to be realized in Nigeria. Also the situation is not consistent with Amo-Kehinde (2003) who stated that no nation ever rises above the quality of its teachers. Good teachers must have been trained and produced through well coordinated and practical programmes so as to influence development in other spheres of life for both individuals and at large society.

There was in availability and inadequate supply of training equipment/facilities in both electrical and electronics section of the technical colleges. The findings have revealed that out of the twenty-eight items listed, only two were available and adequately supplied while twenty-six items listed were inadequate. This situation is not consistent with Ressier (1986) who stressed the need for adequacy of facilities in vocational training. According to him, adequate training facilities enable the learners to actively participate in the learning process and that it has the effect of reducing abstractions to the concrete thereby making learning more meaningful to the learners. Also this situation is not consistent with Ezeji (2004) who emphasized that industrial Arts education requires a laboratory/workshop setting with adequate training facilities as a unique learning situation in which the learner may experiment, test, construct, assemble, repair, design, create, imagine and study. He stressed that an active laboratory/workshop experiences are essential to the study of industrial arts education.

The demonstration method, project method, experiment method, field trips, practice and drill method, discovery, inquiry and problem solving, role playing, game and simulation, individualized instruction programmed instruction, system approach instruction, meta-learning, e-learning, concept mapping, monitoring, coaching and cognitive apprenticeship were not used. The only teaching methods used were questioning, assignment and lecture methods. This is not a practice in consonance with Joyce and Haroontunian (1986) view, which stated that a teacher should be able to use wide range of teaching method to cater for the interest of diverse learners. According to them some learners may understand a lesson through demonstration while other may understand the same when they embark on project work.

The equipment/facilities were not put to effective use to train the students. As revealed by the findings only hammers, set of screw drivers and pliers were effectively used to train the students while the rest of the facilities were not put to effective used in electrical and electrical and electronics sections. This is not consistent with what Nwachukwu (1998) said concerning the use of facilities. According to him the use of facilities depend to a large extent on the instructors' commitment to his professional responsibility and more importantly his resourcefulness and ingenuity. For any technical education programme to be taught, Nwachukwu said that the use of tools and equipment are very necessary, to make the lesson meaningful and interesting to the students.

The time allocated to practical lesson was not adequate. As revealed by the finding only surface wiring and radio repair and maintenance were allocated adequate time in training the students. This is not consistence with Okoro (1993) who stated that all technical courses irrespective of their levels and objectives must stress practical activity, any technical courses in which large proportion of the allotted time is not devoted to practical work, projects and experiment is not likely to be very successful.

Evaluation of practical lesson in electrical and electronics were not adequate. This development was not in consonance with Olaitan (1996) who stated that an assessment of learning outcomes in technical education requires a more pragmatic approach and performance-based than the paper and pencil style. The intended outcome is demonstrated practically and not be memorization he added. Also the situation is not consistent with Nwachukwu (2001) who stress that when students, are engaged in practical work to produce articles or perform given tasks of whatever such activities are required because certain attributes, competencies or skills and value systems inherent in him as well as those attributes openly noticeable which cannot be judged imitatively need to be critically observed and carefully assessed.

The t-test analysis for hypothesis 1 revealed that there is no significant difference between the mean opinion of qualified teacher and less qualified teacher on the extent usage of the equipment/facilities. The non-significant difference between the mean responses of the two groups of respondents could be attributed to the fact that equipment/facilities were obsolete and abandon as a result of poor maintenance. This situation is not in consonant with Olaitan, Nwachukwu, Onyemachi, Igbo and Ekong (1999) they stated that work experience can only be achieve where the training jobs are carried on in the same way with the same operations, the same tools and the same machines as in occupation itself. The null hypothesis is therefore accepted.

There is no significant difference between the mean opinion of the college administrator and teachers on availability and adequacy of training equipment/facilities. This is indicated by the t-test analysis for the null hypothesis 2. The difference could be attributed to the fact that most of the equipment were not supply to the college and many were damaged without replacement. The situation as revealed by the analysis is not consistent with Kavanaugh (1982) who stressed the need to expose students to all necessary tools and equipment required in the trades. This according to him is to avoid the students finding the tools and equipment strange when required to work with them in industries after graduation. The null hypothesis is therefore accepted.

The t-test analysis for hypothesis 3 revealed that there is no significant difference between the mean opinion of experienced

teachers and less experienced technical college teachers on the teaching methods used in practical lessons in the technical colleges. The non-significant difference between the experienced and less experience technical college teachers could be attributed to the fact that teachers were not familiar with the other methods of teaching others than questioning, lecture and assignment methods. The development is not consonant with Hellandendu (1999) who stated that no one method of teaching is sufficient for qualitative training and the teachers should choose a combination of methods. The null hypothesis is therefore accepted.

CONCLUSION

Base on the findings of this study the following conclusion are drawn: training equipment/facilities were not available and inadequate for practical training of the students. The teachers of electrical and electronic section of the technical colleges in Osun State was inadequate especially with regards to industrial/practical experience and numerical strength to handle all the courses in electrical and electronics.

Not all the appropriate methods in teaching vocational technical education course was used to teach the students in technical colleges in Osun State. The time allocated for the practical lessons were not adequate.

RECOMMENDATIONS

1. Adequate number of teachers should be recruited to handle all the courses offered in electrical and electronics in the technical colleges.
2. Adequate facilities should be supplied to the electrical and electronics sections of the technical colleges. The required facilities should be recommended by the teachers and experts in the field.
3. All newly recruited teachers in electrical and electronics should undergo industrial training in reputable industries for at least three months sponsored by the government.
4. Technical college students should undergo industrial attachment programme every long vacation, sponsored by industrial training find (ITF).
5. The training courses and seminars should be organized on regular basis for technical teachers on adoption of all appropriate teaching methods and evaluation technique for vocational technical courses.
6. The government should make it a policy for technical colleges students, especially in Electrical and electronics to embark on regular field trips to acquaint them with industrial facilities. The authority concerned should make fund available for transportation of the students.
7. Practical oriented refresher courses should be organized for all serving electrical and electronics teachers every long vacation.
8. For effective use of facilities, it should be ensure that every teacher is able to operate and or use every tools and equipment available.
9. At least 65% of the total time available should be allotted to practical exercise for effective practical training.
10. There should be an hazard allowance and fringe benefit for technical teachers especially electrical and electronics teachers.

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