Skills Improvement Needs of Electronics Work Trade Teachers in Science and Technical Colleges in North East, Nigeria

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Abstract

The study determined the Skills improvement needs of electronics works trade teachers in science and technical colleges in North East, Nigeria. The study adopted descriptive survey research design. Two research questions was raised and answered and two corresponding hypotheses was tested at 0.05 level of significance. The population of the study consisted of 220 teachers of electronics works trade from 34 science and technical colleges, and 140 teachers was used as sample for the study. The instrument used for collection data was a 16 items structured questionnaire. The instrument was developed by the researchers after extensive literature review based on the specific objectives of the study. The instrument was validated by three research experts while the reliability index of 0.89 was obtained using Cronbach's alpha. The findings of the study revealed that radio and electronic system repairs and maintenance, television repairs and maintenance skills improvement needs of electronics works trade teachers. The recommendations include among others that government and other training institution should improve skills of electronics work trade teachers in public science and technical colleges in television repairs and maintenance.

Keywords: Skills, Electronics work trade, Science and Technical Colleges

Introduction

The development of any nation, state or local government depends on its ability to harness and utilized effectively its material and human resources. In order to achieve this from the grass root electronic works trade was established in Nigerian science and technical colleges with the aim of producing craftsmen who will be self-reliant. Maxwell (2019) asserted that electronic works trade is designed to give training in the skills and impart the necessary attitudes that are needed in order to become an enterprising and self-reliant craftsmen or technicians in consumer electronics workmanship.

Skills involve manipulating of tools and equipment, ability to carry out both preventive and corrective maintenance. Ogbuanya, Akintonde and Bakare (2017) viewed that skill training is a unique aspect of technical college programme that serve as an act of doing, making, manipulating and practicing the theoretical knowledge gained with uses of materials, tools and equipment. As craftsmen and technicians, it is expected that such programme should equip them to function well in the society.

Electronic works trade is offered in Nigerian science and technical colleges with the requisite skills necessary for diagnosing and repairing electronic appliances. It is assumed that the graduate of colleges can further their education or set up their own workshop. Chijoke and Benchuks (2012) stated that the electronics work trade is aimed at training skilled technical manpower equipped with the necessary technical knowledge and practical skills for diagnosing and repairing faults in radio and television systems. These tasks are to be carried out by the student step by step before arriving at final stage of accomplishing the task. The finished product would be assessed by the teacher to find out if the objective of the training is achieved. Okwelle and Assor (2022) stated that electronics as one of the trade studied in technical and vocational centres covers electronics maintenance and repair, electronics appliance, electronics circuit reading, electronics measuring instrument power supply system, electronic instrumentation and control and radio and television among others. NABTEB (2020) stated that students of electronics works trade will be examined based on the following among others in radio communication:

i. Block diagram of: radio transmitter, radio receiver.

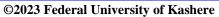Musa Dauda, Bello Hassan and Deba, A. Ahmad   ©2023 Federal University of Kashere

ii. Carrier and modulation in transmitting and receiving radio signals.
iii. Tuning and selectivity in a radio set.
iv. Operation of each stage of radio receiver.
v. Super heterodyne receiver: function of each block, advantages of super heterodyne.
vi. Difference between AM and FM receiver limiter (for long city and long distances).

A television according to Titlow (2012) is a telecommunication medium for transmitting and receiving moving images that can be monochrome (black and white) or coloured with or without accompanying sound. A standard television set comprises multiple internal electronic circuits including those for receiving and decoding broadcast signals. The extent to which the television serves it users depends on the type of receiving device that receives and decode the broadcast signals. Television module is that aspect of science and technical college's curriculum that equip students with skills of diagnosing fault in cathode ray tube television. According to NABTEB (2020) the electronics works trade under television component will be examined under the following subject among others:

i. Sound and picture signals in a television: transmission, reception
ii. Block diagram of a TV receiver: flow of signal, function of each stage
iii. Function of typical areal receiver set
iv. Frequency channels VHF and UHF bands and tuner
v. Picture signals – formation
vi. Scanning and synchronization
vii. Different term used in picture quality: brightness, contrast, picture detail, aspect radio, viewing distance
viii. Video signals – production of good picture quality
ix. Processing of picture and sound signals in different stages of a black and white television set.
x. Control of a TV receiver

The teacher level of education is crucial factor to determine student's achievement. It was categorized according to the highest qualification the teachers obtained, namely Nigeria certificate in education, bachelors, masters or doctoral degrees. A number of studies have examined the ways in which teacher's highest qualifications are related to student's achievement. Many of the studies found that teacher's qualifications correspond positively with student's achievement (Antony & Elangkumaran, 2020). The importance of teacher in teaching and learning cannot be over emphasized. Therefore, teachers are needed to update their knowledge and skills, chose appropriate instructional facilities and methods of teaching. To address the issue of technological change and sustainable development, and need for educators to impart needful skills for self-reliance, Faruk (2005) asserted that teachers must be innovative and adopt a pragmatic entrepreneurial approach to teaching and learning so as to reduce the number of un unemployed young men and women who have for years been queuing for formal employment. Therefore, pragmatic approach is very important in teaching and learning electronic works trade in science and technical colleges. Umar (2014) states that for technical teacher to be regarded as competent they must have a wide knowledge of the subject matter.

The training program offered by the technical colleges in the zone has failed to develop the skills required for employment notwithstanding the huge amount of money spent by government and non-governmental organization on electronic works trade. Kwa and Mahmud (2018) stated that despite the laudable objectives of electronics work trade some teachers still lack adequate maintenance skills which students can use for practical. This is what prompted the researcher to carry out a research to ascertain the skills improvement needs of electronic works trade teachers in science and technical colleges in North Eastern Nigeria with the view of finding useful suggestion that will solve the problems.

Statement of the Problem
Despite the huge amount of money spent by the government and non-governmental organization on vocational and technical education especially electronic works trade so as to make graduates self-reliant as stipulated in the national policy on education (FGN, 2013). Yet, this aim is not fully achieved. Asukwo (2018) also lamented that this trend of affairs indicates that training

Musa Dauda, Bello Hassan and Deba, A. Ahmad

program offered by the technical colleges is not adequate to develop the skills required for employment within the region and beyond. As the world of technology is dynamics, there is need for teachers of electronic works trade to ensure that they comply with the recent technological advancement for effective teaching and learning. This will go a long way in providing productive graduate of electronics work trade at science and technical college level. This is supported by Ogbuanya et al, (2017) who asserted that the field of electrical and electronics technology is expanding and modern technology is bringing new electronics product. This implies that craftsmen and technicians are need to be equipped with required skills for quality services. Contrary to expectation, many are unable to do so. Therefore, the researcher observed that many electronic works trade graduates of science and technical colleges in the North – East Zone of Nigeria are not able to set up their own workshop after graduation. They end at moving on the street waiting for government employment due to the inadequate skills they received at science and technical colleges. This was confirmed by Chukuedo and Ainetor (2015) who stated that teachers of electronics work trade need to improve their skills in the used of tools and equipment to perform such maintenance faults diagnosis skills in order to carry out the maintenance and the actual repairs (corrective maintenance) skills. Despite the state of affairs about failure of electronics work trade teachers to impart adequate skills which will yield competent craftsmen who can repair and maintain television. Considering this issue at science and technical college level in the north eastern Nigeria, it is difficult to ascertain if the aim of the course is adequately achieved. Similarly, studies conducted over the years has failed to focus on skills improvement needs of electronics works trade teachers at science and technical college level. This has prompted the researcher to fill in this existing gap.

Objectives
The broad objective of this study is to identify skills improvement needs of electronic works trade teachers in science and technical college in North–East, Nigeria. Specifically, this study sought to:
1. Determine repairs and maintenance skills improvement needs of electronic works trade teachers in radio and electronics system servicing
2. Determine repairs and maintenance skills improvement needs of electronic works trade teachers in television servicing.

Research Questions
In line with research objectives these research questions were raised:
1. What are the repairs and maintenance skills improvement needs of electronic works trade teachers in radio and electronics system servicing?
2. What are the repairs and maintenance skills improvement needs of electronic works trade teachers in television servicing?

Hypothesis
The following hypotheses were formulated to guide the study and were tested at .05 level of significance.
H_{01}. There is no significance difference between the mean responses of N C E teachers and B Tech teachers in the repairs and maintenance skills improvement needs in radio and electronics system servicing.
H_{02}. There is no significance difference between the mean responses of N C E teachers and B Tech teachers in the repairs and maintenance skills improvement needs in television servicing

Methodology
The study adopted a descriptive survey research design. The study was carried out in North East Nigeria which comprised six states. The six states comprise of Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe state. The population of the study was 220 teachers of electronics work trade from all the thirty-four accredited science and technical colleges in the north east Nigeria (NBTE, 2021). The sample for the study consisted of 140 teachers; twenty four teachers (24) from Adamawa state (10 from GSTC Mubi, 6 GSTC Numan, 8 from GSTC Yola), twenty eight (28) teachers

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from Bauchi state (12 from GSTC Bauchi, 7 from GSTC Gadau, 3 from GSTC Gamawa, 6 from GSTC Gumau), thirty four (34) teachers from Gombe state (10 from GSTC Barunde, 8 from GSTC Gombe, 10 from GSTC Kwami, and 6 from GSTC Kumo), twenty eight (28) teachers from Taraba state (8 from GSTC Gembu, 10 from GSTC Jalingo and 10 from GSTC Karin Lamido) and twenty six (26) teachers from Yobe state (7 from GSTC Gaidam, 3 from GSTC Gujba, 8 from GSTC Potiskum, 8 from GGSTC Potiskum) they were randomly selected as the sample of the study. The choice of 140 is in line with sample size determined by Krejcie and Morgan table. A 16 items questionnaire was used to collect data. The questionnaire was developed by the researchers based on the existing literature. Five-point rating scale of Highly Needed (HN) = 5, Needed (N) = 4. Moderately Needed (MN) = 3, Slightly Needed (SN) = 2, and Not Needed (NN) = 1 was used. The instrument was validated by three experts in technology education and measurement and evaluation, all comments, suggestions and recommendations were considered before the final copy of the questionnaire. The reliability of the instrument was determined using

Cronbach's alpha the choice of Cronbach alpha reliability is because is used when a different number of points are assigned to different options of each test items. For example, on a likert attitude or interest scale, the individual may obtain a score ranging from 5 to 1, depending of the option chosen by such individual (Enemali, 2010). The reliability index obtained was 0.89. The researchers with the four research assistants administered the instrument. The completed instrument was collected after two days this is because some of the respondents are not available in the first day of administering. The descriptive statistics of mean and standard deviation was used to answer the research questions. The cut-off point of 3.0 was used. Therefore, mean responses of 3.0 and above was considered as needed while means responses of less than 3.0 was considered as not needed by the respondents. The hypotheses were tested using t-test at 0.05 significant levels using SSPS version 25.

Research Question 1: What are the repairs and maintenance skills improvement needs of electronic works trade teachers in radio and electronics system servicing?

Table 1: Mean and Standard Deviation of Electronics Work Trade Teachers on Repairs and Maintenance Skills Improvement Needs in radio and electronics system servicing.

S/N	Variables	N	Mean	SD	Decision
1.	Ability to clear fault using signal tracer	140	3.50	1.042	Needed
2.	The working principles of amplifiers and associated stereophonic system has no positive impact in science and technical colleges	140	3.58	1.080	Needed
3.	Ability to carry out receiver performance test to verify the specification of the system.	140	3.56	1.061	Needed
4.	Ability to describe the construction and characteristics of audio and video tape recorder	140	3.60	1.130	Needed
5.	Ability to describe the construction and characteristics of Video Compact Disc (VCD) and player set.	140	3.48	.948	Needed
6.	The working principles of double super heterodyne receiver help teachers of electronics works trade.	140	3.59	1.032	Needed
7.	The block diagram in the principle of operation of double super heterodyne receiver has no significance to electronic work trade teachers	140	3.44	1.146	Needed
8.	Ability to repair faults due to adjacent channel interference and image channel interference	140	3.58	1.046	Needed
9.	Ability to eliminate fault of amplifiers	140	3.47	1.056	Needed
10.	Repairing of all electronics and mechanical fault related to audio and CD equipment	140	3.40	1.098	Needed
11-	Ability to test and measure radio and electronics system	140	3.45	1.095	Needed

12.	Ability to bias oscillation tuning has positive impact on radio and electronic system	140	3.42	1.080	Needed
13	Ability to interpret the schematic diagrams of a cassette cartridge mechanism	140	3.50	1.190	Needed
14	Improve car radio installation and maintenance	140	3.51	1.063	Needed
15	Modulation and demodulation circuits in AM and FM radio sets did not improve skills of electronics works trade teachers	140	3.39	1.104	Needed
	Grand Mean		**1.07**	**3.48**	

Table 1 was used to answer research question 1 regarding radio and electronic system repairs and maintenance skills improvement responses by electronics work trade teachers in science and technical colleges in North-East, Nigeria. The result revealed that all the items exceed the cut-off point of 3.0 as an acceptance region, with the grand mean of 3.48 and standard deviation of 1.07. This implies that radio and electronics system repairs and maintenance teachers need skills improvement on all the fifteen items.

Research Question 2: What are the repairs and maintenance skills improvement needs of electronic works trade teachers in television servicing?

Table 2: Mean and Standard Deviation of Electronics Work Trade Teachers on Repairs and Maintenance Skills Improvement Needs in television servicing.

SN	Variables	N	Mean	SD	Decision
1.	Ability to identify normal stage of the television set, using a block diagram	140	3.58	1.100	Needed
2.	Ability to clear fault common to synchronous stage.	140	3.69	1.032	Needed
3.	Did not operate IF generator to clear faults in a television set.	140	3.10	1.027	Needed
4.	Ability to remove, install and adjust cathode ray tube	139	3.59	1.041	Needed
5.	Set correctly the pre-set and non-pre-set controls on a television receiver.	140	3.56	.969	Needed
6.	Ability to carry out the investigation of pulse generator stage.	140	3.49	1.116	Needed
7.	Ability to operate the colour bar generator to test signal.	140	3.69	.890	Needed
8.	Explaining the use of the colour decoder	140	3.54	1.096	Needed
9.	Did not explain colour mixing techniques used in television.	140	3.41	.996	Needed
10.	Did not explain how picture and sound signals are processed in different stages of black and white TV.	140	3.26	1.129	Needed
11.	Determining the principles operation of the various stages of a television.	140	3.54	1.021	Needed
12.	Ability to operate various electronic instruments to clear faults in a television set.	140	3.44	1.040	Needed
13	Did not differentiate between static and dynamic colour convergence.	140	3.23	1.013	Needed
14	Ability to identify the symptoms and clear faults common to each stage of a coloured TV set.	140	3.46	1.115	Needed
15	Ability to trace and rectify faults of remote control	140	3.42	1.106	Needed
16	Ability to check power supply and front panel control	140	3.58	.914	Needed
	Grand Mean		**3.47**	**1.040**	

Table 2 was used to answer research question 2 on television repairs and maintenance skills improvement needs of electronic works trade teachers in science and technical colleges in North-East, Nigeria. The result revealed that all the items exceed the cut-off point of 3.0 as

Musa Dauda, Bello Hassan and Deba, A. Ahmad

an acceptance region, with the grand mean of 3.47 and standard deviation of 1.040. This implies that television repairs and maintenance teachers need skills improvement on all the sixteen items.

Hypothesis One: There is no significance difference between the mean responses of NCE teachers and B. Tech teachers in the repairs and maintenance skills improvement needs in radio and electronics system servicing.

Table3: T-test on the Difference between the Responses of NCE & B. Tech Teachers on the Repairs and Maintenance Skills Improvement Needs in Radio & Electronics System Servicing.

Variables	Qualification	N	Mean	SD	DF	t -value	P-value	Decision
Radio and Electronic System	NCE	54	54.02	6.932				
	Degree	86	51.50	5.608	138	2.36	0.020	Rejected

P<0.05

Table 3 showed a computed t-test result for the difference of teachers of electronics works trade based on their qualification on skills improvement needs in radio and electronics system in colleges of North-East Nigeria. The result shows a significant difference (t (138) = 2.36, p = 0.020< 0.05), since the calculated p-value is less than the tabulated p-value as level of significant, Therefore, the null hypothesis was rejected.

The finding revealed that there is significant difference based on qualification on skills improvement needs in radio and electronic system in colleges of North-East Nigeria.

Hypothesis two: There is no significance difference between the mean responses of NCE teachers and B. Tech teachers in the repairs and maintenance skills improvement needs in television servicing

Table 4: T-test on the difference in responses of NCE & B. Tech Teachers of Electronics Works Trade on Skills Improvement Needs in Television Repairs & Maintenance

Variables	Qualification	N	Mean	SD	DF	t-value	P-value	Decision
Television Repairs	NCE	54	56.09	9.371				
and Maintenance	Degree	86	55.17	5.709	138	0.721	0.000	Rejected

P<0.05

Table 4 showed a computed t-test result for the difference of teachers of electronics works trade based on their qualification on skills improvement needs in television repairs and maintenance in colleges of North-East Nigeria. The result shows a significant difference (t (138) = 0.721, p = 0.000 < 0.05), since the calculated p-value is less than the tabulated p-value as level of significant, Therefore, the null hypothesis was rejected. The finding revealed that there is significant difference on qualification on skills improvement needs in television repairs and maintenance in colleges of North-East Nigeria.

Findings of Study
1. Radio and electronic system repairs and maintenance skills improvement needs of electronics work trade teachers involves the ability to clear fault using signal tracer, ability to repair fault due to

adjacent channel interference and image channel interference, ability to carry out receiver performance test to verify the specification of the system, and ability to bias oscillation tuning.
2. Television repairs and maintenance skills improvement needs of electronics work trade teachers involves the ability to operate the colour bar generator to test signal, ability to identify the symptoms and clear faults common to each stage of coloured TV set, ability to trace and rectify faults of remote control and ability to check power supply and front panel control.
3. There is significant difference between the responses of teachers with NCE and B. Tech qualification on their skills improvement needs in radio and electronics system.
4. There is significant difference between the responses of teachers with NCE and

Musa Dauda, Bello Hassan and Deba, A. Ahmad

B. Tech qualification on their skills improvement needs in television repairs and maintenance.

Discussion of Findings

The result of research question one in table 1 which was on radio and electronics system skills improvement needs of electronics teachers. Data analyzed for research question one revealed that all the 15 Items as being skills improvement needs of electronics works trade teachers in radio and electronics system servicing. These findings are in agreement with idea of Chukuedo and Ainetor (2015) who stated that teachers of electronics work trade need to improve their skills in the used of tools and equipment to perform such maintenance faults diagnosis skills in order to carry out the maintenance and the actual repairs (corrective maintenance) skills. Kwa and Mahmud (2018) also mentioned that advance in technology challenges teachers to constantly introduce and demonstrate new technologies to their students to better prepare them to enter technological advance world of work. In order to meet industry needs, technical colleges teachers must continue to stay on forefront of technology and pedagogy. To meet these demands, these teachers need in-service training opportunities from both educational institutions and industries. It is through in-service training that such teachers are able to expand their knowledge and improve their pedagogical skills so they are better able to serve their students and community in which they teach.

With respect to the corresponding hypothesis, the data presented in table 3 and table 4 revealed that the null hypothesis was rejected as there is significant deference based on the qualification on skills improvement needs in radio and electronics system in science and technical colleges in North East, Nigeria. This finding is in agreement with Antony and Elangkumaran (2020) who stated that The teacher level of education is crucial factor to determine student's achievement. It was categorized according to the highest qualification the teachers obtained, namely Nigeria certificate in education, bachelors, masters or doctoral degrees. A number of studies have examined the ways in which teacher's highest qualifications are related to student's achievement. Many of the studies found that teacher's qualifications correspond positively with student's achievement.

The result of research question two in table 2 which was repairs and maintenance in television skills improvement needs of electronics works trade teachers. It was found that teachers of electronics work trade in science and technical colleges in north east, Nigeria need improvement in all the identified skills. This finding is in conformity with Eze and Ekemu (2016) who said that teachers also need to improve their teaching process by partaking in in-service training to update their competences aimed at up skilling technical college students to enable them adjust to the world of paid employment or self-reliance on graduation. Joseph, Makinde and Yakubu (2018) who stated that radio, television and electronics work trade teachers need training in radio, television and electronics work.

With respect to the corresponding hypothesis in table 4 the null hypothesis was rejected and accepted the alternative hypothesis as there is significant difference based on qualification on skills improvement needs in television repairs and maintenance in science and technical colleges in North East, Nigeria. This finding is in agreement with Antony and Elangkumaran (2020) who stated that The teacher level of education is crucial factor to determine student's achievement. It was categorized according to the highest qualification the teachers obtained, namely Nigeria certificate in education, bachelors, masters or doctoral degrees. A number of studies have examined the ways in which teacher's highest qualifications are related to student's achievement. Many of the studies found that teacher's qualifications correspond positively with student's achievement.

Conclusion

The importance of skills improvement needs of electronics works trade teachers cannot be over emphasized. This is because whenever the skills of the teachers are improved their output will also increase. These contribute to achieve the aims and objectives of science and technical colleges in the north eastern Nigeria. It is therefore necessary to identify skills improvement needs of electronics works trade teachers in radio and electronics

Musa Dauda, Bello Hassan and Deba, A. Ahmad

system servicing and television repairs and maintenance. The findings of the study revealed that there is need to improve the skills of electronics works trade teachers in the area such as ability to carry out the investigation of pulse generator stage, ability to operate identify the symptoms and clear faults common to each stage of a coloured TV set and ability to operate various electronic instrument to clear faults in television set.

Recommendations

1. Government and industries should improve skills of electronics work trade teachers in public science and technical colleges in radio and electronic system servicing.
2. The administrators of science and technical colleges should organize in house work shop to improve skills of electronics work trade teachers in public science and technical colleges in television repairs and maintenance.
3. Government and other training institutions should improve skills of electronics work trade teachers in public science and technical in television repairs and maintenance.

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