Development and Validation of New Closed-Circuit Television Systems Contents for Satellite Transmission and Reception Module for Technical Colleges in Nigeria

By

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ABSTRACT

The study developed new closed-circuit television systems contents for satellite transmission and reception module for technical colleges in Nigeria. The study adopted a four stage research and development research design. A sample of 228 was obtained using; purposive and random sampling techniques from a population of 346. Data were collected using a structured questionnaire that had a reliability coefficient of 0.83. The data collected from the respondents were analysed using mean statistics, standard deviation and t-test. The study revealed new cognitive and psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems for satellite transmission and reception module including: applications of closed-circuit television systems, operational requirements for installing closed-circuit television, and best practices for setting up and termination procedures for display screens, among others. The study also revealed that there was no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new cognitive and psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems. It was recommended that NBTE should consider splitting the current satellite transmission and reception module into four composite parts, such as closed-circuit television cameras installation and maintenance, which would cater for a more focused acquisition of skills.

Keywords: *Closed-circuit television systems, Curriculum contents, Radio, Television and Electronic Work, Technical College.*

INTRODUCTION

Every society designs its educational system to suit the needs of the generality of its people. Hence, high premium is attached to the curriculum of each subject area in accordance with their respective peculiarities. This is based on the fact that the content of the curriculum of each discipline goes a long way in determining the outcome of the training programme it was designed for. According to Offorma (2014), curriculum content is made up of the subject matter to be taught, body of knowledge, topics, ideas, concepts, symbols, facts and cognitions, presented to the learners. Jayanthi (2017) remarked that curriculum contents refers to what is taught in schools, including the subject matter, topics, concepts, ideas, knowledge within a particular subject and how they will bring about change in the individual and to the society. The curriculum contents of technical colleges in Nigeria are classified into; cognitive, affective and psychomotor contents. This is in order to place the technical colleges on the pedestal of being

able to appropriately impart the skills needed for national development.

Technical colleges (TCs) are institutions that provide students with sellable practical skills that would enable them lead comfortable lives and contribute to the economic growth of the nation. According to the Federal Republic of Nigeria (FRN) (2013), TCs are post-primary institutions that impart the necessary skills leading to the production of craftsmen and technicians who are enterprising and self-reliant. In addition to this, the National Board for Technical Education (NBTE), (2016) revealed that the curriculum of technical colleges are designed to facilitate the acquisition of skills by the students in various trade areas, including: Agricultural Implement Mechanics, Auto Electric Works, Motor Vehicle Mechanics, Vehicle Body Building, Block-laying, Bricklaying and Concreting, Carpentry and Joinery, Draftsmanship Craft Practice, Furniture Design and Construction, Machine Wood Work, Painting and Decoration, Appliances Maintenance and Repairs, Electrical Installations and Maintenance Works, Instrument Mechanics, and Radio, Television and Electronic Work.

Radio, Television and Electronic Work (RTV), as one of the trade areas available in technical colleges in Nigeria, 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 craftsman or technician in consumer electronic workmanship. There are quite a number of cognitive and psychomotor skills RTV graduates are expected to possess in order to be able to cope with the demands of the world of work. Such skills include: measuring and cutting of metals, interpretation of circuit diagrams, carrying out basic electricity calculations, understanding of the working principles and applications of various electronic devices, troubleshooting of electronic systems, installation of Satellite Transmissions and Reception systems, construction of Radio and Audio Frequency Amplifiers, producing Electrical/Electronic Drawing, and operation of Television cameras (NBTE, 2001). In order to infuse RTV curriculum with the potentials of equipping TC students with these skills, with a view of enhancing their employability, the curriculum is divided into smaller units referred to as modules.

A module is a well-defined short course of study that forms part of a larger academic course or training programme, which when successfully completed can be used for employment purposes without having to complete the larger course. According to NBTE (2001), a module is a body of knowledge and skills capable of being utilized on its own or as a foundation or pre-requisite knowledge for more advanced work in the same or other fields of study. Modules have been accepted as the most effective ways of imparting practical skills on learners in Technical and Vocational Education and Training (TVET) programmes (Siagian, 2014). This is because modularisation offers TVET programmes multiple benefits leading towards development of new skills and improving on old ones. The benefits offered by modularisation include: greater flexibility in planning and organizing educational process; greater efficiency and cost-effectiveness of educational process; better response to the labour market needs; improved vertical and horizontal mobility, and more efficient response to individual needs and capacities of students and adult students (Republic of Serbia, 2008; Robinson and Crittenden, 2012). The modules used for training RTV students include: Basic Electricity, Electronic Devices

and Circuits, Radio Communication, Radio and Audio Frequency Amplifiers, Television, and Satellite Transmissions and Reception (NBTE, 2001).

Satellite Transmission and Reception (STR) module is that aspect of the TC curriculum that equip students with skills in the broadcasting of digital radio-frequency signals and the conversion of the signals into a form that can be viewed on a television set. Based on NBTE (2001) course specification for RTV is subdivided into four components; (1) satellite transmission systems, (2) satellite reception, (3) television camera systems; and (3) closed circuit television systems (CCTV). But this study focused on developing new closed circuit television contents because the existing curriculum does not contain sufficient and current topics that will enable TC students acquire skills capable of boosting their employability.

Closed Circuit Television (CCTV) is the use of video cameras for capturing images for the purpose of viewing in predetermined monitors or television screens. Kumar and Svensson (2015) submitted that CCTV refers to the use of video cameras to transmit a signal to a specific place, on a limited set of monitors. CCTV differs from broadcast television in that the signal is not openly transmitted, though it may employ point to point, point to multipoint, or mesh wireless links. CCTV is one of the components of STR module used for training RTV students in the Nigerian technical college system. As it stands today, many homes, business environments, schools and offices in Nigeria make use of CCTV systems and as a result provide numerous job opportunities which can be harnessed by technical college graduates. DVR Connection, Inc. (2009) noted that understanding the fundamentals of CCTV is crucial in installing and maintaining a trouble free CCTV/DVR system as well as providing a high quality video documentation of an incident.

Hence, for a module such as STR module to effectively provide Nigerian youths with employment opportunities, under the present technological dispensation, there is the need to look into closed-circuit television systems, with a view of coming up with the latest cognitive and psychomotor skills contents that will enable RTV graduates to function maximally in the CCTV industry. Since, the whole essence of training technical college students in CCTV systems is to equip them with skills, new contents both cognitive and psychomotor will among other things provide them with numerous employment potentials in installation and troubleshooting of closed-circuit television systems (Raymond, 2013; Ogbuanya, 2005). Troubleshooting is the act of observing a malfunction in electronic equipment, pinpointing the cause and clearing the malfunction. Troubleshooting is the ability to determine the cause of a malfunction in electronic equipment and then correct it (Stauffer & Traister, 2007). On the other hand, installation is the process of assembling all the components of electronic equipment and making it ready for use (Merriam-Webster, 2015). In the same vein, Gill, Little, Spriggs, Allen, Argomaniz and Waples (2005) noted that skills in the installation and troubleshooting of CCTV systems can provide youths with employment. This is based on the fact that areas that may need monitoring such as bars, banks, casinos, schools, hotels, airports, hospitals, restaurants, military installations, convenience stores and other areas where security is needed, are being opened on daily basis. This therefore creates a huge demand for skills in CCTV installation and maintenance.

The first CCTV system was installed by Siemens at Test Stand VII in Peenemünde, Nazi Germany in 1942, by Walter Bruch, Wayne Cox, and Tashara Arnold, for observing the launch of V-2 rockets (Dempsey, 2008; Kumar and Svensson, 2015). The systems involved constant monitoring because there was no way to record and store information. However, the emergence of VCR technology in the 1970s, made it easier to record and erase information, and use of video surveillance became more common (McCahill & Norris, 2002). Digital multiplexing was introduced in early 1990s, allowing several cameras to record at once, as well as time lapse and motion-only recording (Roberts, 2013). This increased savings of time and money and the led to an increase in the use of CCTV. Since 2000s CCTV technology has been enhanced with a shift toward internet-based products and systems, and other technological developments (Walsh & Farrington, 2009; Crowley, 2013). In essence, technological innovations such as miniaturised CCTV systems, introduction of wireless CCTV systems and CCTV with internet routers have been innovated, and this happened after 2001. This therefore is an indication that the current STR module with respect to CCTV contents is fast becoming obsolete for use in the training TC students. Consequently, the curriculum of RTV and especially STR module requires some form of updating with up to date contents.

For a student to be deemed to have completed STR Module, and be able to compete favourably with their counterparts from other parts of the world, he must master all aspects of the module (NBTE, 2001). This includes both the cognitive and the psychomotor skills contents. Although the curriculum of RTV extends to an aspect of educational objectives referred to as affective domain, which is mainly concerned with emotions, feelings, attitudes and self-esteem of the learner (Kuboja & Ngussa, 2015). However, this study is focused on cognitive and psychomotor contents. This is because affective learning takes place in a school system alongside the learning of cognitive and psychomotor contents of any curriculum. Cognitive contents have to do with theories/principles related to STR, and the psychomotor skills contents have to do with the manipulative skills contents of the module. Theoretical knowledge (cognitive contents) helps the students to acquire a deeper and concise understanding of STR concepts, phenomena and principles through visualizing them in the proper context (Ferris and Aziz, 2005). Psychomotor skills contents on the other hand, equip students with the skills they need for professional careers. The psychomotor skills entails that TC graduates are able to effectively carry out tasks using their hands involving; installation, operation and troubleshooting of STR equipment. This is why both cognitive and psychomotor skills contents are critical to the curriculum of the trade.

In the development of curriculum in skill based areas such as RTV, the people directly involved in the industry under consideration, called Subject Matter Experts (SMEs), are allowed to make input in the curriculum process, since they have the first hand information on the developments taking place. SMEs are people with special knowledge or skills in a particular area of endeavour (Tonini, 2013). SMEs are important in this study because, they determine the steps, related knowledge, attitudes, performance standards, tools and materials needed, and safety concerns required of people performing tasks, for inclusion into the curriculum. The SMEs in

STR module with respect to CCTV systems are Electrical/Electronic industrial personnel and Electrical/Electronic teachers. Electrical/Electronic industrial personnel are highly trained people, with or without professional registration, who have worked for years in the CCTV industry, carrying out daily activities in installation and maintenance of CCTV equipment. Electrical/Electronic teachers on the other hand, are highly trained people in Electrical/Electronic, whose daily activities involve teaching courses in CCTV either at the university or at the TC level over the years.

The use of SMEs in curriculum development process can help in the production of qualitative curricula that can be used for the development of human capital of nations in all fields of human endeavour (Mattoon, 2005). Frenzel (2003) noted that in order to maintain a strong technical workforce, there is an increasing need for colleges and training institutes to update their curriculum so that it addresses the latest technologies and industry practices. The module on STR is not an exception. This is due to the technological developments and innovations recorded in the industry in recent past. Hence, there is the need to investigate the emerging cognitive and psychomotor skills contents for satellite transmission and reception module in order to enhance employability among RTV craftsmen graduating from technical colleges in Nigeria.

Statement of the Problem

One of the objectives of NBTE for the graduates of Radio, Television and Electronic Work craftsmanship is that on completion of their training programme, they should be able to secure employment in any sector of electronic industry, including Closed Circuit Television. Sadly, this objective does not appear to be adequately realised. This is because majority of the technical college graduates are unemployed as a result of lack of adequate practical skills needed in the modern day workplace (Ismail & Mohammed, 2015; Raymond, 2013). Apparently, the training that these RTV graduates acquired in technical colleges seems inadequate to make them enterprising and self-reliant. In fact, despite the numerous job opportunities created daily due to the emergence of new companies and products in the Closed Circuit Television industry, RTV craftsmen are among the millions of Nigeria youths searching for jobs (National Bureau of Statistics, NBS, 2016).

This unemployment trend caused by lack of adequate practical skills is attributed to the fact that the existing STR module, being used since 2001 in the training of TC graduates, lacks qualitative and up-to-date cognitive and psychomotor skills contents. Owing to the several technological developments that have taken place in STR industry since then. New technological developments have necessitated the possession of modern skills such as installation and maintenance of; miniature, internet routed and digital wireless CCTV camera systems. On this basis, the module is obsolete and inadequate for the training of TC graduates for the present day work situations. The implication of this is that, if nothing is done to up-date the current STR module with contents that will commensurate with the present technological developments as well as help the TC graduates be up to date, they would continue to be poorly prepared and inadequately equipped for the challenges of the world of work in the industry. Hence, in order to enhance employability of TC graduates, there is the need for an up-to-

date STR module with contents emerging from the new technologies being introduced into closed circuit television industry. Therefore, the problem of this study is; what are the new closed circuit television contents that could be included in the satellite transmission and reception module for technical colleges in Nigeria?

Aim and Objectives of the Study

The aim of this study is to develop new closed circuit television systems contents for satellite transmission and reception module for technical colleges in Nigeria. Specifically, the objectives of this study are to develop and validate new:

1. Cognitive contents for the installation and troubleshooting of closed-circuit television systems.
2. Psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems.

Research Questions

The following research questions guided the study:

1. What are the new cognitive contents for the installation and troubleshooting of closed-circuit television systems?
2. What are the new psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

H_{O1} There is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new cognitive contents for the installation and troubleshooting of closed-circuit television systems.

H_{O2} There is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems.

METHODOLOGY

The study adopted research and development (R & D) research design. Gall, Gall and Borg (2007) explains that R & D in the field of the education is a design-based research used to develop new programmes and materials to improve education. R & D process as stated by Gall, Gall and Borg (2007) has 10 main steps. However, the development of this module was restricted to four stages which are; preliminary study, development, assembly and validation. This is consistent with the submissions of Gooch (2012) and Pranoto, Atieka, Wiharjo, Wibowo and Nurlaila (2016) who revealed that when the conditions for adopting the 10 steps proposed by Gall, Gall and Borg are not ideal, some of the steps may be omitted. In addition to this, Damiri (2012) submitted that R & D in an educational setting could be done as a simplification of three stages namely; preliminary study, development and validation.

The population of the study consisted of all the 346 SMEs in STR industry in Kwara, Niger, Kaduna and FCT-Abuja. This included the 12 CCTV services companies, seven higher institutions offering Electrical/Electronic Technology Education, and 15 technical colleges in the study area. From this, 228 SMEs were sampled using purposive sampling technique. The final list of the participants that were used at each of the four stages of the study were selected through random sampling using balloting technique. The distribution of the final sample was made up

of; the nine SMEs used for the instrument development, 205 used for main data collection and five used for the assembly panel. This gave a total of 219 SMEs that participated in the study. Data were collected using the researcher constructed instrument titled: New Closed-Circuit Television Systems Contents Development and Validation Instrument for Satellite Transmission and Reception Module. The instrument had two parts; I and II. Part I was used to elicit information on the personal data of the respondents. Part II contained 36 questionnaire items that were further divided into two sub-sections in line with the two research questions. The instrument was a four-point rating scale of Strongly Agree (SA=4), Agree (A=3), Disagree (DA=2), and Strongly Disagree (SD=1).

The research instrument was face and content validated by three experts who are all Electrical/Electronic teachers. Two of them are Electrical/Electronic Technology Education lecturers from the Department of Vocational and Technology Education (VTE), Abubakar Tafawa Balewa University, Bauchi, and the Department of Industrial and Technology Education, Federal University of Technology Minna respectively. The third is a Radio, Television and Electronic Work teacher, from Government Technical College, Pategi. The face validated instrument was pilot tested using 35 SMEs in Kano State. The respondents consisted of Electrical/Electronic industrial personnel and Electrical/Electronic teachers. Since the data generated were polytomous (data which has no preferred response) in nature, the coefficient of internal consistency of the instrument was calculated using Cronbach's Alpha.

The reliability coefficient of the research questions were calculated separately and it yielded 0.84 and 0.82 respectively, while that of the entire instrument was 0.83. A total of 205 (which was made up of 123 Electrical/Electronic industrial personnel and 82 Electrical/Electronic teachers) SMEs participated in the main data collection. The research instrument was administered on the respondents with the help of four research assistants, one each for Niger, Kaduna, Kwara states and the FCT, Abuja. However, 118 questionnaires from Electrical/Electronic Industrial Personnel and 77 Electrical/Electronic Teachers, representing 95.1% of the total number distributed, provided the information that were used for data analyses. The data collected from the respondents were analysed using mean statistics, standard deviation and t-test. Mean and standard deviation were used to answer the research questions, while the null hypotheses were tested at 0.05 level of significance using t-test. All statistical calculations were done using the Statistical Package for the Social Sciences (SPSS) version 22. Also, in order to determine the agreement level of the items of the research questions, the mean ratings of respondents were interpreted using real limits of numbers. 1.00-1.49 was considered strongly disagree, 1.50-2.49 was considered disagree, 2.50-3.49 was considered agree and 3.50-4.00 was considered strongly agree. To test the null hypotheses at 0.05 level of confidence, the significant criterion (sig.) of the Levene's test for equality of variance was compared with 0.05. Where the sig. was less than 0.05, the equal variance not assumed t value was compared with 0.05 level of significance. The hypotheses were accepted where this t value was greater and rejected where the t value was less. Alternately, equal variance assumed t value was compared with 0.05 where the sig. of Levene's test for equality of variance was equal to or greater than 0.05.

Again, the hypotheses were accepted where this t value was greater than 0.05 and rejected where the t value was less.

RESULTS

The result of the analysis of data are presented in accordance with the research questions and hypotheses that guided the study.

Research Question One: What are the new cognitive contents for the installation and troubleshooting of Closed-circuit Television systems?

Table 1: Mean and Standard Deviation of the Responses of Electrical/Electronic Industrial Personnel and Teachers on the New Cognitive Contents for the Installation and Troubleshooting of Closed-circuit Television systems

N_{IP} = 118, N_{EET} = 77

S/No	Cognitive contents for the installation and troubleshooting of Closed-circuit Television systems	X_{IP}	SD_{IP}	X_{EET}	SD_{EET}	X_A	SD_A	REM
1.	Safety practices in closed-circuit television industry.	2.85	0.99	2.97	0.97	2.91	0.98	Agree
2.	Tools and equipment used in closed-circuit television.	3.31	0.80	3.78	0.42	3.55	0.61	Strongly Agree
3.	Types of cables used in closed-circuit television systems; VGA, HDMI, power supply splitter cables, USB, coaxial, CAT 5, RG58, RG59, SDI, SD-SDI, HD-SDI. Advantages and disadvantages.	3.33	0.64	3.52	0.50	3.43	0.57	Agree
4.	Applications of closed-circuit television systems; security, safety.	2.83	0.85	3.10	0.90	2.97	0.88	Agree
5.	Operational requirements for installing closed-circuit television.	3.36	0.95	3.64	0.65	3.50	0.80	Strongly Agree
6.	Introduction to closed-circuit television systems.	3.08	0.71	3.45	0.95	3.27	0.83	Agree
7.	Principles of operation, block diagrams and types of designs of closed-circuit television systems.	3.39	0.74	3.95	0.32	3.67	0.53	Strongly Agree
8.	Introduction to PTZ and Kopex, and passive baluns.	3.47	0.50	3.53	0.50	3.50	0.50	Strongly Agree

S/No	Cognitive contents for the installation and troubleshooting of Closed-circuit Television systems	X_{IP}	SD_{IP}	X_{EET}	SD_{EET}	X_A	SD_A	REM
9.	Introduction to DVRs and types, 2, 4, 8, 16 channels and router enabled DVRs.	2.69	0.66	3.48	0.50	3.09	0.58	Agree
10.	Storage devices in closed-circuit television systems; hard disks, USB drives, memory cards.	2.74	1.01	3.58	0.50	3.16	0.76	Agree
11.	Best practices for setting up and termination procedures for display screens.	3.25	0.88	3.71	0.58	3.48	0.73	Agree
12.	Types of monitors; Computer screens, TV sets with VGA, HDMI and USB capability.	3.37	0.75	3.71	0.45	3.54	0.60	Strongly Agree
13.	Methods of transmission in CCTV systems.	3.38	0.49	3.13	0.88	3.26	0.69	Agree
14.	Review of the configuration of IP network cameras and CoDecs.	3.72	0.45	3.78	0.42	3.75	0.44	Strongly Agree
15.	Introduction to ICT products in CCTV, softwares.	2.79	0.65	3.42	0.82	3.11	0.74	Agree
	Total	**3.17**	**0.74**	**3.52**	**0.62**	**3.35**	**0.68**	Agree

N_{IP}, X_{IP}, SD_{IP} = number, mean and standard deviation of Electrical/Electronic industrial personnel, N_{EET}, X_{EET}, SD_{EET} = number, mean and standard deviation of Electrical/Electronic teachers, and X_A, SD_A = Average mean and standard deviation.

Table 1 shows the mean and standard deviation of the responses of Electrical/Electronic industrial personnel and teachers on the new cognitive contents for the Installation and Troubleshooting of Closed-circuit Television systems. The result of the analysis revealed that five items; 2, 5, 7, 12 and 14 which had average mean ratings of 3.55, 3.50, 3.67, 3.54 and 3.75 respectively. These ratings were in the 3.50 – 4.00 real limit and so the respondents were in strong agreement with the items. Similarly, items; 1, 3, 4, 6, 8, 9, 10, 11, 13 and 15 had average mean ratings ranging between 2.91 and 3.48. These ratings fall into the 2.50 – 3.49 real limit and so the respondents were in agreement with these 10 items of the research question. Furthermore, the 15 items had their standard deviation ranged from 0.44 – 0.88 each of these values was less than the normal deviate of 1.96 indicating that the respondents responses were not too far from the mean. This added value to the reliability of the means.

Research Question Two: What are the new psychomotor skills contents for the installation and troubleshooting of Closed-circuit Television systems?

Table 2: Mean and Standard Deviation of the Responses of Electrical/Electronic Industrial Personnel and Electrical/Electronic Teachers on the New Psychomotor Skills Contents for the Installation and Troubleshooting of Closed-circuit Television Systems

N_{IP} = 118, N_{EET} = 77

S/No	Psychomotor skills contents for the installation and troubleshooting of Closed-circuit Television systems	X_{IP}	SD_{IP}	X_{EET}	SD_{EET}	X_A	SD_A	REM
1.	Demonstration of safety practices involved in CCTV installation.	3.12	0.72	2.70	0.61	2.91	0.67	Agree
2.	Identification of tools and equipment used in CCTV industry.	3.50	0.58	2.84	0.51	3.17	0.54	Agree
3.	Demonstration of the handling of tools and equipment used in CCTV industry.	3.58	0.54	3.66	0.62	3.62	0.58	Strongly Agree
4.	Identification of CCTV systems parts and components, camera, DVR, monitor, cables, power supply, storage devices.	3.31	0.63	3.71	0.58	3.51	0.61	Strongly Agree
5.	Identification of various types of cables used in CCTV systems.	3.11	0.60	3.71	0.45	3.41	0.53	Agree
6.	Demonstration of cable routing and management in CCTV systems.	2.60	0.90	3.13	0.88	2.87	0.89	Agree
7.	Demonstration of assembling and dissembling of CCTV systems components.	3.11	0.52	3.78	0.42	3.45	0.47	Agree
8.	Inspecting and testing CCTV systems components for functionality.	3.29	0.54	2.97	0.97	3.13	0.76	Agree
9.	Carrying out site survey for CCTV cameras.	3.49	0.50	3.78	0.42	3.64	0.46	Strongly Agree
10.	Setting up and applying function switches on cameras.	2.57	0.91	3.52	0.50	3.05	0.71	Agree

11.	Selecting and installing appropriate lens and camera combinations.	3.75	0.44	3.10	0.90	3.43	0.67	Agree
12.	Demonstration of masking, tour set up and programming of dome cameras.	3.58	0.50	2.90	1.02	3.24	0.76	Agree
13.	Wiring a fully functional camera (PTZ) using Kopex and multi-core cabling, VGA, HDMI, power supply splitter cables, USB, coaxial, RG58, RG59.	3.29	0.64	3.45	0.95	3.37	0.79	Agree
14.	Applying active and passive baluns to CAT5, RG58, RG59 cabling circuits.	3.20	0.66	3.95	0.32	3.58	0.49	Strongly Agree
15.	Installing cameras over long runs of cable.	3.19	0.74	3.53	0.50	3.36	0.62	Agree
16.	Setting up and connecting multiple cameras to DVRs.	2.92	0.79	3.48	0.50	3.20	0.65	Agree
17.	Installing a complete CCTV system.	3.44	0.69	3.58	0.50	3.51	0.60	Strongly Agree
18.	Testing and commissioning CCTV after installation.	3.28	0.71	3.34	0.60	3.31	0.66	Agree
19.	Use of computer systems in CCTV installation and maintenance.	2.95	0.61	3.71	0.45	3.33	0.53	Agree
20.	Use of smart phones applications for CCTV installation and troubleshooting.	3.20	0.65	3.13	0.88	3.17	0.77	Agree
21.	Troubleshooting CCTV systems components failure.	3.53	0.65	3.78	0.42	3.66	0.54	Strongly Agree
	Total	**3.24**	**0.64**	**3.42**	**0.62**	**3.33**	**0.63**	**Agree**

Table 2 shows the mean and standard deviation of the responses of Electrical/Electronic industrial personnel and Electrical/Electronic teachers on the new psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems. The information reveals that Electrical/Electronic industrial personnel and Electrical/Electronic teachers agreed with 15 items of research question eight by rating them with average means ranging between 2.87 and 3.45,

which are in the 2.50 – 3.49 real limit. However, six items; 3, 4, 9, 14, 17 and 21 with average mean value of 3.62, 3.51, 3.64, 3.58, 3.51 and 3.66 respectively which were in the 3.50 - 4.00 real limit were strongly agreed upon by the respondents as the new psychomotor skills contents for the installation and troubleshooting of Closed-circuit Television systems. Table 2 also indicated that the items of research question eight were rated close to the mean by the respondents, in the sense that average standard deviation range was 0.46 - 0.89 and are below 1.96 which is the standard normal deviate. This has further strengthened the integrity of the means.

Hypothesis One

H_{01} There is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new cognitive contents for the installation and troubleshooting of closed-circuit television systems.

Table 3: T-Test Analysis of Differences in the Responses of Electrical/Electronic industrial personnel and Electrical/Electronic Teachers on the New Cognitive Contents for the Installation and Troubleshooting of Closed-Circuit Television Systems

	Levene's Test for Equality of Variances		**t-test for Equality of Means**						
								95% Confidence Interval of the Difference	
	F	**Sig.**	**T**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
Equal variances assumed	10.746	.001	3.549	193	.000	.30690	.08647	.47744	.13636
Equal variances not assumed			3.725	185.710	.000	.30690	.08239	.46944	.14435

N= number of respondents, SD = standard deviation, df = degree of freedom, sig = significant criterion

Table 3 shows a summary of the t-test analysis of differences in the responses of Electrical/Electronic industrial personnel and Electrical/Electronic teachers on the new cognitive contents for the installation and troubleshooting of closed-circuit television systems. The result of the analysis showed that the significant criterion (sig.) of the Levene's test for equality of variance was 0.001, which is less than 0.05 (the confidence level). Therefore, equal variance not assumed t value of 3.725 was compared with 0.05 level of significance. Since 3.725 is greater than 0.05, the hypothesis was therefore accepted. Hence, there is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new

cognitive contents for the installation and troubleshooting of closed-circuit television systems.

Hypothesis Two

H_{0_2} There is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new psychomotor skills contents for the installation and troubleshooting of Closed-circuit Television systems.

Table 4: T-Test Analysis of Differences in the Responses of Electrical/Electronic industrial personnel and Electrical/Electronic Teachers on the New Psychomotor Skills Contents for the Installation and Troubleshooting of Closed-Circuit Television Systems

	Levene's Test for Equality of Variances		**t-test for Equality of Means**						
								95% Confidence Interval of the Difference	
	F	**Sig.**	**T**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
Equal variances assumed	.107	.744	2.336	193	.021	.15618	.06686	.28805	.02431
Equal variances not assumed			2.302	154.483	.023	.15618	.06785	.29020	.02215

N= number of respondents, SD = standard deviation, df = degree of freedom, sig = significant criterion and p = probability value.

Table 4 is the summary of the t analysis of differences in the responses of Electrical/Electronic industrial personnel and Electrical/Electronic teachers on the new psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems. The table show that the significant criterion (sig.) of the Levene's test for equality of variance was 0.744, which is greater than 0.05 (the confidence level). Therefore, equal variance assumed t value of 2.336 was compared with 0.05, and for being greater than 0.05, the hypothesis was accepted. Therefore, there is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems.

FINDINGS OF THE STUDY

Based on the data collected and analysed, the following findings emerged:

1. Electrical/Electronic industrial personnel and teachers agreed on the new cognitive contents for the installation and troubleshooting of

closed-circuit television systems such as; applications of closed-circuit television systems, operational requirements for installing closed-circuit television, and best practices for setting up and termination procedures for display screens, and best practices for setting up and termination procedures for display screens.

2. Electrical/Electronic industrial personnel and teachers agreed on the new psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems such as; Demonstration of Assembling and dissembling of CCTV systems components, Setting up and connecting multiple cameras to digital video recorder, and installing a complete CCTV system.
3. There is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new cognitive contents for the installation and troubleshooting of closed-circuit television systems.
4. There is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems.

DISCUSSION OF FINDINGS

Finding revealed that (table 1) Electrical/Electronic industrial personnel and teachers agreed on the new cognitive contents for the installation and troubleshooting of closed-circuit television systems such as; applications of closed-circuit television systems, operational requirements for installing closed-circuit television, and best practices for setting up and termination procedures for display screens, and best practices for setting up and termination procedures for display screens. In the same vein, table 3 revealed that there is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new cognitive contents for the installation and troubleshooting of closed-circuit television systems. This implies that equipping youths with up-to-date sellable skills is an important way of addressing the problem of employability among them. And this can be best done when the curriculum used for such trainings are updated with relevant cognitive contents capable of facilitating the realization of the desired goals. In support of this, Udofia and Nlebem (2013) and Alias and Siraj (2012) revealed updating the curriculum for training youths with cognitive contents in skill based subjects is important as it helps them make use of relevant and current technology in modern work situations. Adequate theoretical knowledge in the installation and troubleshooting of closed-circuit television systems helps students pick up practical skills faster and be in a better position to meet the needs of clients in work situations.

Findings from table 2 revealed that Electrical/Electronic industrial personnel and teachers agreed on the new psychomotor skills contents for the installation and troubleshooting of closed-circuit television systems such as; demonstration of assembling and dissembling of CCTV systems components, setting up and connecting multiple cameras to digital video recorder, and installing a complete CCTV system. Table 4 revealed that there is no significant difference between the mean responses of Electrical/Electronic industrial personnel and teachers on the new psychomotor skills

contents for the installation and troubleshooting of closed-circuit television systems. This is similar to the findings of Alias and Siraj (2012) who noted that carrying a periodic update of the curriculum for training youths with new contents is very important. In addition to this, Auditor and Naval (2014) in support of these findings hinted that the items of a similar module developed were strongly acceptable to peers (teachers) and experts in terms of: objectives, content, design characteristics, learning activities, adaptability, clarity and evaluation. These therefore further buttress the fact that if the youths of this nation would become more productive members of the society, they must be equipped with up-to-date sellable skills through the use of curricula that are updated with relevant psychomotor skills contents that can foster the achievement of national goals.

CONCLUSION

The employability of the youths of Nigeria is a critical subject in national discourse. All hands have been on deck with a view of proffering a solution to the menace. Hence, looking at the state of things as of now, a seventeen years old curriculum is not only old-fashioned and grossly inadequate in making graduates become what they are trained to be, but has also helped in making them unemployable. This study therefore, developed and validated the new closed-circuit television systems contents for satellite transmission and reception module for technical colleges in Nigeria. Many topics including: applications of closed-circuit television systems, operational requirements for installing closed-circuit television, and best practices for setting up and termination procedures for display screens, and best practices for setting up and termination procedures for display screens, demonstration of assembling and dissembling of CCTV systems components, Setting up and connecting multiple cameras to digital video recorder, and installing a complete CCTV system, were discovered and put together.

Training RTV students with an updated curriculum such was produced by this effort has attendant positive implications not only for the technical college system, but for the nation at large. In essence, it means that technical college graduates will not only be able to handle all problems that his counterparts in other countries would handle, but also stand to compete favourably with them. If this happens, their employability could greatly be enhanced and their ability to contribute their quota towards the economic and technological development of our country Nigeria would be greatly boosted.

RECOMMENDATIONS

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

1. The National Board for Technical Education (NBTE) should consider revitalizing the satellite transmission and reception module by including the contents developed in this study into the technical college RTV curriculum in the next curriculum review and it should be done as soon as possible with respect to cognitive and psychomotor skills contents of closed-circuit television camera systems.
2. The NBTE should consider splitting the current satellite transmission and reception module into four composite parts, such as closed-circuit television cameras installation and maintenance, which would cater for a more focused

acquisition of skills. This is in order to make it less cumbersome.

3. The NBTE in collaboration with ministries of education at all levels across the country should periodically organize retraining workshop and seminars for RTV teachers in other for them to acquire the competencies that would enable them better able to teach the trade in technical colleges as a result of the new contents that this study discovered.
4. Stakeholders in the provision of Technical and Vocational Education and Training (TVET) in Nigeria should provide technical colleges with the latest facilities needed for the teaching and learning of; satellite transmission systems installation and maintenance, satellite reception systems installation and maintenance, television cameras operation and maintenance and closed-circuit television cameras installation and maintenance.

REFERENCE

Alias, N., & Siraj, S. (2012). Design and development of physics module based on learning style and appropriate technology by employing Isman instructional design model. *The Turkish Online Journal of Educational Technology*, *11*(4), 84-93.

Crowley, S. (2013). Capacity trends in direct broadcast satellite and cable television services. *National Black Church Initiative*. Retrieved on 27 November 2016 from http://www.nbrbonline.org/pdf/capacity-trends.pdf.

Dempsey, J. S. (2008). *Introduction to private security*. Belmont, CA: Thomson Wadsworth.

DVR Connection, Inc. (2009). *CCTV Knowledge base & technical manual*. Education Curriculum in Tertiary Institutions in Nigeria for Youth Empowerment. In G. N. Nneji., F. O. N, Onyeukwu, M. Ukpongson., E. A Nnenji. and B.M Ndomi. (Eds). *Technology Education for sustainable Youth Development in Nigeria*. (pp. 65-72) Proceedings of NATT 18th Annual National Conference.

Federal Republic of Nigeria, (2013). *National policy on education*. Lagos. NERDC Press.

Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction (8a. Ed.)*. Boston: Pearson Allyn and Bacon.

Gill, M., Little, R., Spriggs, A., Allen, J., Argomaniz, J. & Waples, S. (2005). *Assessing the impact of CCTV: the hawkeye case study. Research, development and statistics directorate.* Retrieved on 12th January 2017 from http://www.homeoffice.gov.uk/rds.

Gooch, D. L. (2012). *Research, development, and validation of a school leader's resource guide for the facilitation of social media use by school staff*. A Ph.D Dissertation of the Department of Educational Leadership, College of Education, Kansas State University Manhattan, Kansas.

Jayanthi, M. C. (2017). Understanding Disciplines and Subjects: Course Material for First Year B.Ed (2016-2017). Tamil Nadu Teachers Education University. Retrieved

June 14 2017 from http://www.tnteu.in/pdf/c5.pdf.

Jereb, J. (2016). *The technical problem and its didactic function: Eric Document*. Retrieved on 23rd December 2016 from https://archive.org/stream/ERIC_ED391699/ERIC_ED391699_djvu.txt

Kumar, V. & Svensson, J. eds. (2015). Promoting social change and democracy through information technology. IGI Global.

McCahill, M., & Norris, C. (2002). *On the threshold to urban panoption? Analysing the employment of CCTV in European cities and assessing its social and political impacts*. Urbaneye. Retrieved on 10th January 2017 from www.urbaneye.net.

Merriam-Webster, (2015). *Merriam-webster dictionary.* Manchester: Merriam-Webster Inc.

National Board for Technical Education (NBTE) (2014). *Guidelines and procedures for the establishment of private technical and technological institutions in Nigeria.* Kaduna. NBTE Press.

National Board for Technical Education (NBTE), (2001). *National technical certificate and advanced national technical certificate curriculum and course specifications for radio, tv & electronic work.* Kaduna. NBTE.

National Board for Technical Education (NBTE), (2016). *Directory of accredited programmes offered in polytechnics, technical and vocational institutions in Nigeria*. Kaduna. NBTE Press.

National Bureau of Statistics. (2016). *Unemployment/ under-employment watch Q3 2016.* Retrieved on 25th December 2016 from www.nigerianstat.gov.ng

Offorma, G.C. (2014). Approaches to curriculum development. In Nwagwu, N., & Ivowi, U., *Education in Nigeria: Development and challenges* (pp.77-91). Lagos: Foremost Educational Publishers.

Ogbuanya, T. C. (2005). Integration of troubleshooting into Electronic Technology. Enugu: Cheston Ltd

Pranoto, H., Atieka, N., Wiharjo, S. D., Wibowo, A., & Nurlaila, S. (2016). Group guidance services with self-regulation technique to improve student learning motivation in junior high school. *Educational Research and Reviews.* 11(24), 2146-2154. Retrieved on 13th February 2017 from http://www.academicjuornals.org/ DOI: 10.5897/ERR2016.2955.

Raymond, E. (2013). *Comparative effect of cognitive and traditional task analysis-based instructional guides on technical college students' achievement and interest in electronic work in north–central, Nigeria.* (Unpublished doctoral dissertation), University of Nigeria, Nsukka, Enugu State. 65, 14-38.

Roberts, L. (2013). History of video surveillance and CCTV surveillance. Retrieved on 10th January 2017 from www.videosurvailance.com.

Robinson, J. W., & Crittenden, W. B. (2012). Learning modules: a concept for extension educators? *Journal of Extension*, winter 2002.

Salve-Opina, A. (2014). The development and validation of online learning modules for college English. *American International Journal of*

Contemporary Research, 4(2), 89-97.

Siagian, S. (2014). Development of basic electronic instructional module and trainer. *European Journal of Computer Science and Information Technology*, *2*(3), 36-46.

Stauffer, H. B., & Traister, J. E. (2007). *Electrician's troubleshooting and testing pocket guide* New York: McGraw-Hill.

Udofia, N., & Nlebem, B. S. (2013). Skills acquisition in plantain flour processing enterprises: a validation of training modules for senior secondary schools. *Universal Journal of Educational Research*, *1*(3): 255-261.

Walsh, B. C., & Farrington, D. P. (2009). Public area CCTV and crime prevention: An updated systematic review and meta-analysis. *Justice Quarterly*, 26 (4), 716–745. Doi:10.1080/07418820802506206.

