

Employers' Perception of the Applied Skills of NCE Graduates of Electrical-Electronic Technology In Nigerian Public And Private Organizations

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Abstract: *The purpose of this study was to investigate the perception of employers of NCE graduates of electrical electronics in public and private organizations with regard to the applied skills they possess in performing their assigned functions. The study was a survey design conducted among 93 employers of holders of NCE certificates in electrical electronics technology from FCE(T) Bichi, working in public and private organizations in Kano State. The instrument of data collection was a structured questionnaire, developed by the researcher and validated by three experts from University of Nigeria, Nsukka. A pilot study was conducted among 30 employers of holders of NCE certificates in electrical-electronics technology from FCE (T) Asaba Delta State, working in Asaba. The instrument yielded a Cronbach's alpha reliability coefficient of 0.93, indicating that it was very reliable at measuring what it was purported to measure. The study has highlighted about 28 important applied skills expected from holders of NCE certificates in electrical/electronics, working in public and private organizations. Findings have shown that holders of NCE certificates in electrical electronics technology in Nigerian public and private organizations have only possessed 11 applied skills out of the 23 applied skills highlighted in the study, implying that they do not possess the remaining 17 applied skills. Consistently, there was no significant difference in the responses of employers of graduates of electrical/electronics technology in public and private organizations. The study implies that NCE graduates of electrical/electronics in Nigerian public and private organizations are lacking adequate applied skills for them to effectively function in the enterprise. The study recommends that more emphases should be given to teaching practical skills in Nigerian colleges of education than mere theory. Further studies may focus at investigating how the applied skills possessed by NCE graduates of electrical electronics affect their performance in the enterprise.*

Keywords: Employers' perceptions, Applied skills, Electrical-electronics graduates, Colleges of education, Nigeria

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I. Introduction

Empirical evidence has shown that acquiring skills are fundamental to optimizing productivity of individuals at work. Consistently, to be knowledgeable an individual should not only be equipped with theoretical knowledge but also with certain specific traits and skills. Hence, knowledge does not end at theory; rather it encompasses the application of practical skills (Atkins & Georgantzas, 1989). Invariably, NCE graduates of Electrical/Electronics technology are expected to be well equipped with certain applied skills that can make them productive and innovative in the society. Basically, the advancements and developments of nations are significantly dependent upon the productive capacity of the people within, (Cherepovskaya, Gorshkova, & Lyamin, 2017). In this connection, Olaitan (1999) has observed that several nations of the world accord top priority and spend huge amounts of their income on science and technical education programs. Graham (2003) has accorded the difference between advanced and developing nations to the level of scientific and technological developments of the nations with significant bearing to the implementation of technological education programs.

Technical education has been defined as an aspect of education that leads to the acquisition of practical and applied skills as well as basic scientific knowledge designed to prepare individuals for employment in specific areas of occupation (Adeyemi and Uko-Aviomoh 2004). Technical education has also been described as an academic and vocational preparation of students for jobs involving applied science and modern technology (Osuala, 1991). The Federal Ministry of Education, Nigeria FME (2004) has stated that the main objective of technical education is the preparation of graduates for occupations that are classified above the skilled craft but below the scientific or engineering profession (Nweke, 2017).

Technical education at the college of education level aims at training and imparting the necessary knowledge and skills needed by craftsmen and technicians for entrepreneurship and self-reliance. Hence, college of education graduates employed, as craftsmen in industries need to possess work potentials that employers would need.

Accordingly, FME (2004) have described technical education as a kind of education that provides students with scientific principles relating to their fields of technology and requires them to make practical application of the concepts they learn by working with tools and machines. The aims of technical education as stipulated in the National Policy on Education include:

1. To provide the technical knowledge and vocational skills necessary for agriculture, industrial, commercial, and economic development.
2. To give an introduction to professional studies in engineering and other technologies; and
3. To give training and impart the necessary skills leading to the production of craftsmen, technicians and other skilled personnel who will be enterprising and self-reliant.

However, the attainment of these laudable objectives would depend on the qualitative and quantitative production and training of technical teachers who need to implement the program under a classroom environment, ensuring that their products are being employed in the industry. Overall, technical skills in Electrical/Electronic technology have to do with the ability to use tools and equipment effectively and in an efficient manner; the ability to perform the work of the day such as troubleshooting an electronic device taking readings from electrical instruments, troubleshooting circuit boards, electrical installations and so on (Barber, 2003).

II. Literature Review

While there are common trends determining perceptions of employers on the applied skills possessed by graduates of electrical/electronics technology working in Nigerian public and private organizations, there are important variances from culture to culture and region to region (Aderemi, Hassan, Siyanbola, & Taiwo, 2007). Garcia, (2016) has revealed that apart from theory, students need skills that are non-cognitive in nature, such as critical thinking skills, problem solving skills, social skills, persistence, creativity, and self-control. According to Garcia (2016) such skills allow students to contribute meaningfully to society and to succeed in their public lives, workplaces, homes, and other societal contexts. However, although there are only few strategies tailored at nurturing applied skills in the past within the school context or through education policies, currently the skills are beginning to be acknowledged in discussions about education, leading to the need for thoughtful and concerted attention from researchers, policymakers, and practitioners (Garcia, 2016). The purpose of this study was therefore to investigate the perception of employers of NCE electrical electronics graduates in public and private organizations concerning the applied skills they possess.

The Concept Of Electrical/Electronics Technology

Electrical/Electronics technology is a course in technical education that equips individuals with specific skills, knowledge, and attitudes to enable them maintain, repair, and construct basic electrical/electronic systems in practice (Nweke, 2017). Basically, Electrical/electronic technology equips student with knowledge, skills and attitudes needed for performance in the field of electrical/electronics and for gainful employment (John, 1995) According to Nweke, (2017) electrical/electronic technology is an offshoot of technical education program offered in technical colleges, polytechnics, colleges of education (technical) and universities in Nigeria in order to produce technical teachers who will be able to inculcate scientific and technological knowledge to individuals. Osuala (1991) stated that technical education prepares technicians for employment opportunities by giving them training in the use of drawing instruments, gauges, applied sciences, mathematics, common sense, initiative, analysis, and diagnosis; by training them on how to collect data, make computations, perform laboratory test and preparing report; and by providing experience in planning, repairing, supervising and controlling machines. Hence, electrical/electronics teachers in colleges of education (Technical) are expected to inculcate these skills in their students as contained in the curriculum. However, achieving this can only be done through effective teaching. Therefore, electrical/electronics technology is designed to achieve the following objectives:

To produce qualified and competent electrical/electronic technology graduates who will be capable of teaching electrical/electronic technology subjects in the junior secondary schools.

1. To produce NCE electrical/electronics technology graduates who will be able to inculcate the scientific, vocational and technological aspect of Electricity / Electronics technology, attitudes and values into the society.
2. To produce qualified NCE electrical/electronic technology students who will start the so much desired revolution of vocational and technological development in Nigerian schools;

4. To prepare students in electrical/electronic technology with necessary competencies to qualify them for a two year post NCE degree program in electrical/electronic technology.
5. To equip and produce qualified NCE electrical/electronics technology graduates with the right skills for engaging in industrial work life as well as for self employment (FGN, 2009).

The foregoing shows that graduates of NCE technical education in electrical/electronics technology need to be well equipped with adequate technical and professional competencies/skills if they are to perform effectively in the enterprise. Hence, the focal point of this study was to investigate the perception of employers of NCE graduates of electrical electronics technology in public and private organizations with regard to the applied skills possessed by the graduates.

Applied Skills for Graduates of Electrical/Electronic Technology

In today's workforce, where changes and increasing competitions are obvious, it is important for policy makers in education to design and implement programs that would provide students with adequate competencies to perform in the enterprise. Whereas the cost of developing human capital is increasing, institutions of education such as Colleges of Education (Technical) need to ensure that they produce graduates who would not only have technical skills but also non-technical skills that are applied in nature. Studies have shown that applied skills in technical education can provide students with the opportunity to practice their technical profession to solve problems and improve their lives, and experiences (Ballard, & Daniel, 2016). Therefore, in the current trend, technical skills are very topical in measuring the levels of development and advancements of nations and societies (Geisinger, 2016). Unfortunately, according to World Bank (2005) graduates of leading Colleges of Education (Technical) in Nigeria do not meet the expectations of industrial employers despite their high standard certificates. Findings in Uwameiye (2000) and Okorie (1987) have shown that Colleges of Education (Technical) in the Southeastern and Southwestern States are inadequately equipped regarding training facilities, teaching staff and libraries for the implementation of NCCE minimum standards. Consequently, the graduates of these colleges were discriminated against employment due to lack of adequate knowledge and technical skills and competencies requirements for new appointments in industries. This study has attempted to review a number of related literature on the topic of interest and a tentative list of those applied skills that are considered important in developing the capacity of NCE graduates of electrical electronic education to perform more effectively at work are presented as follows:

- i) Interpreting a simple electric circuit diagram: Units of current, voltage, resistance power Ohm's law and Kirchhoff's laws.
- ii) Understanding electromagnetism: Magnetic flux, force on current-carrying conductors, electromagnetic induction, Fleming's right hand rules and Lenz's Law.
- iii) Understanding the inductance in a d.c.circuit: Self inductance, inductive and non inductive circuits and units of inductance.
- iv) Understanding electrostatics: Structure of atom, electric charges, movement of electrons in a conductor, electrostatic units, capacitors in series and parallel.
- v) Understanding d.c.machines: Equation, armature reaction and efficiency of d.c.machines.
- vi) Understanding d.c. Motors: Speed and torque characteristics, starting speed, d. c. motor control and applications.
- vii) Understanding transformers: Transformer action, transformer tests, the voltage regulations, autotransformers, three phase transformers.
- viii) Understanding electrical/electronics measurements: Moving coil iron, thermocouple, ammeters, voltmeters, watt-meters, ohmmeter and potentiometer.
- ix) Understanding amplifiers: Small-signal audio frequency amplifiers, negative feedback amplifiers, audio frequency power amplifiers and tuned amplifiers.
- x) Understanding electromagnetism: Magnetic flux, force on current-carrying conductors, electromagnetic induction, Fleming's right hand rules and Lenz's Law.
- xi) Understanding the inductance in a d.c.circuit: self inductance, inductive and non inductive circuits and units of inductance.
- xii) Understanding electrostatics: structure of atom, electric charges, movement of electrons in a conductor, electrostatic units, capacitors in series and parallel.
- xiii) Understanding the d.c.machines: Equation, armature reaction and efficiency of d.c.machines.
- xiv) Understanding d.c. Motors: Speed and torque characteristics, starting speed, d. c. motor control and applications.
- xv) Understanding d. c. generators; Method of excitation, open circuit characteristics, load characteristics of series and shunts generators.
- xvi) Understanding the generation of alternating e.m.f: average and r.m.s values

- xvii) Understanding electrical circuits: Single phase, two phase and three phase circuits, circuits with R, L, C series & parallel
- xviii) Understanding electrical-electronics measurements: moving coil iron, thermocouple, ammeters, voltmeters, watt-meters, ohmmeter and potentiometer.
- xix) Understanding semiconductor devices: Atomic structure, covalent bonds, n-type, p-type and semi-conductors.
- xx) Understanding electrolysis: Primary and secondary cells, simple voltaic cells, Leclanche cell, mercury cells, characteristics of lead-acid and alkaline cells.
- xxi) Understanding the field-effect transistors: the junction-field effect transistors, the metal oxide semiconductor field effect transistor, static characteristics and integrated circuits.
- xxii) Understanding amplifiers: small-signal audio frequency amplifiers, negative feedback amplifiers, audio frequency power amplifiers and tuned amplifiers.
- xxiii) Installing trucking or duct electrical wiring containing many wires at a time: in series and parallel connections.
- xxiv) Installing d.c.machines and d.c.generators: in series and parallel connections.
- xxv) Installing domestic electrical appliances: gold leaf circuits electroscopes, simple electric cookers and circuit alarm bells.
- xxvi) Installing electronic amplifiers: simple amplifiers, audio amplifiers, and wide band amplifiers.

Conceptual Orientation

The conception of this study was based on the proposition of the social cognitive theory of human development of Bandura (1986), which theorized that both support and reprisal influence performance behavior. Bandura (1986) upheld that people's belief regarding the support or reprisal they expect for learning something would inspire them to pay attention to it and mentally process it in an effective fashion, or otherwise. The theory claimed that when people do not expect support or reprisal for their actions they are however, less likely to think about or process their actions in a reasonable way (Ormrod, 2003).

A study was conducted by Robinson (2006), on graduates of Agricultural education and Food and Natural Resources Education to investigate their employability skills on graduation. The study highlighted 67 employability skills and ranked them in order of importance based on their mean scores. Findings revealed that all the 67 employability skills were considered as very important to the graduates for employability. The study also revealed that some of the graduates perceived themselves as being more competent in the 67 employability skills than most others.

Hoo, NaSurdin;Chain, & Ignatius, (2009) conducted a study on Employers perception/preference for foreign trained graduates. The purpose of the study was to examine (i) whether employers prefer foreign trained graduates (FG) vis-a-vis local graduates (LG) and graduate from local twinning program (TG) and (ii) whether there is a significant difference in the overall performance perception (OPP) of these 3 groups of graduates over different time frames. Data was collected from Human Resources Managers and Administrative Managers of Public listed companies as well as from small and medium Enterprises in the northern region of Malaysia, using an on-line survey. Findings from the study revealed that employers perceived foreign trained graduates to be superior in terms of employability skills such as communication skills (verbal & written), confidence / self wage, computer / IT skills; creative / inoperative skills; and analytical skills and flexibility / adaptability compared to their local counterparts. In terms of overall performance perception (OPP), foreign graduates too were deemed superior.

A study on employers' perception of the preparation of agricultural and extension education graduates for job in the enterprise was conducted by Graham, (2003). The main purpose of the study was to determine the knowledge, skills and abilities desired by employers at entry-levels from graduates of the department of Agricultural and Extension Education. Findings of the study have revealed that the level of preparation of AEED graduates with regard to their knowledge, skills and abilities in technical competencies was low.

Hassan, Mukhtar, Ahmad, & Mustapha, (2010) conducted a study on the importance of employability skills from employers' perspective. The respondents consisted of 180 employers in various fields of engineering in Peninsular, Malaysia. Findings have shown that the employers have considered employability skills as fundamental requirements for graduates. The study also showed no significant difference between the size of company and employability skills. It was recommended based on the study that authorities of educational institution should enhance the employability skills of the students either through the professional development of lecturers, curriculum and co-curriculum.

Ismail, Yusuf & Sing (2010) conducted a study on employers' perception of the skills possessed by graduates in Malaysian service sector and their performances at work. A total 749 employers in the Service sector were involved in the study. Findings have shown that the respondents gave moderate scores to all the graduates with regard to the skills they possessed and their performances at work.

Importance of Applied Skills in Training NCE Graduates of Electrical/Electronic Technology

Applied skills are practical skills that support the theoretical knowledge acquired by an individual. Basically, such skills are practiced on a daily basis. Webster, (2008) have opined that practice is something that is applied in full motion; and without practice, theory is useless. The ability to put theory into practice can be regarded as the ability to apply the expertise knowledge acquired. However, practice cannot be successful without appropriate theoretical support (Arayries and Schon 2009).

A study was conducted to investigate the differences between the perceptions of employers and the perceptions of undergraduates on the importance of employability skills. The study also investigated whether the undergraduates' core competencies were able to meet up with the requirements of their employers and equally analyzed the effectiveness of personal qualities and employability skills development in private universities in Malaysia. Findings of the study showed that the undergraduates were all highly competent in possessing the said personal qualities and skills. However, such skills as critical analysis, planning, problem solving oral communication, decision making and negotiating reported a slightly higher level of mismatch between employers and undergraduates perception on their importance and development (Wye and Lim, 2009)

In Nilsson (2003), findings have shown that Swedish vocational secondary schools provided training in practical skills to school pupils in form of workshop activities that focus on productive craftsmanship in conditions akin to those of the factory. However, discussing the mechanism for manpower improvement in Nigeria, Olaitan (1999) has revealed that employers in Nigeria have considered products of technical institutions unusable without additional technical training and technical college programs had little practical work content to make their graduates readily employable. But for any scientific training to yield best results, it must be practiced; and practice could only be learned by practice (Kazanas & Perkinson, 2002). This suggests that in every field of endeavor, certain technical/practical or applied skills are fundamental for optimum performance and results. Hence, Finch and McGough (2005), and Eze (2002) have considered practical skills as integral components of vocational education, which support creativity and innovation among vocational graduates. Accordingly, Finch et al., (2005), and Eze (2002) have contended that for vocational graduates to succeed in the labor market they need to be exposed to the realities of the workplace, and opportunities should be given to them by the school system to experience the practical and applied scenario of the enterprise before graduation.

Unfortunately, a major problem of vocational education in Africa and other developing economies is the dearth of practical skill training (Finch et al., 2005; Eze 2002). A study conducted in Nigeria by Anya (2003) has revealed that employers were satisfied with the theoretical contents of vocational education but were dissatisfied with the practical aspects of vocational education because the on-the-job coverage was below their expectations. The explanation provided for the problem included, shortage of training facilities, poor communication between industries and training institutions and lack of dynamic leadership by governments and their agencies. The Nigerian Education, Research and Development Council NERDC (2004) and Nwachukwu (1999) have also revealed the need for a closer link between education and work, knowledge and know-how, knowing something and knowing how to produce it, in order to make education contribute effectively towards the development of Africa. To achieve this objective, NERDC recommended that at the secondary school education level, students must be prepared for productive work by equipping them with the necessary professional skills and aptitude for practical work. Hence, whereas it is the job of the technician to break down the production plan into detailed design, the skilled craftsmen must be trained to produce the finished article; making use of their technical knowledge, manual skills and detailed application of relevant tools.

The need for vocational education institutions to have a curriculum that emphasizes training students on applied skills, using appropriate tools and technology, has been highlighted in (Robert, 2009). According to Robert (2009), students need to be prepared for living as well as for making a living; and hence, they should undergo extensive pre-service training before they are employed. Robert (2009), World Bank Report (2009), Nash (2010) and Blank (2000) addressed the irrelevancies of certain vocational secondary education programs by pointing out that some were characterized by too much theories, rote memorizations, lack of application of what was learnt and advised that such curricular should be parallel with the realities of the conditions of the industrialized world.

Overall, we found from the foregoing, that little or no attention was given on investigating the applied skills of NCE graduates, particularly with regard to the Nigerian perspective. In an attempt to level up this gap, this study focuses at investigating the perception of employers of holders of NCE certificates in electrical electronics from FCE (T) Bichi, working in public and private organizations, with regard to the applied skills possessed by the candidates in performing their assigned functions. The study proposes the following research question and hypothesis:

RQ *What are the perceptions of employers of NCE graduates of electrical/electronics technology in public and private organizations on the applied skills possessed by the graduates they employed?*

H0 *There is no significant difference on the mean responses of employers of NCE graduates of electrical/electronics technology in public and private organizations on the applied skills possessed by the graduates they employed?*

I. Research Methodology

This study was a survey design conducted among 93 employers of NCE graduates of electrical/electronics technology in 93 public and private organizations in Kano State. 68 of the employer swere from private organizations and 25 of them were from public organizations in Kano State. The focus of the study was on graduates of electrical/electronics from FCE (T) Bichi. The instrument of data collection was a structured questionnaire developed by the researcher and validated by three experts from University of Nigeria, Nsukka. The instrument was also pilot-tested on 30 respondents and it yielded a Cronbach's alpha reliability coefficient of 0.93, implying that it was reliable at measuring what it was purported to measure (Ary, Jacobs & Razavich, 2006) Proportionate random sampling was used in administering the questionnaire on the sample of the study. The questionnaire was administered to the sample of the study through three research assistants who were indigenes of the location of the research and who were adequately guided to distribute and retrieve the questionnaires. Data collected from the study was analyzed using mean and standard deviation to answer the research question of the study while t-test statistics was used to test the study hypothesis at a significance level of 0.05.

II. Method of Data Analysis

This study has highlighted 28 important applied skills expected from holders of NCE certificates in electrical/electronics, working in public and private organizations. Data was analyzed using SPSS v22 to arrive at the Mean and Standard Deviation values for the variables of study. T-test analysis was used to test the hypothesis of the study at $P \leq 0.05$ level of significance. 4-point Likert rating options was assigned real limit values as follows:

3.50	–	4.00	–	Highly Possessed (HP)
2.50	–	3.49	–	Moderately Possessed (MP)
1.50	–	2.49	–	Poorly Possessed (PP)
1.00	–	1.49	–	Not Possessed (NP)

During the analysis, any skill item found with a mean value of 3.50 or above was considered as "Possessed by the graduates" while those skill items found with mean values below 3.50 were regarded as 'Not Possessed by the graduates'. The hypothesis of no-significant difference was upheld for items whose t-calculated (t-cal) values were less than the t-table (t-tab) value at $P < 0.05$ level of significance. Consistently, the hypothesis of no significant difference was rejected for items whose t-calculated values were greater than the t-table value of 1.96 at $P < 0.05$ level of significance and at 91 degree of freedom.

III. Results

Results of the analyses of the opinions of employers of graduates of electrical/electronics technology public and private organizations on the applied skills they possess are shown on Table 1 and Table 2. Table 1 shows the mean ratings of the responses of the participants of the study on 11 items, out of 28 ranging between 2.52 and 3.18; higher than the cut-off point value of 2.50 on a 4-point rating scale. This implies that the employers of NCE graduates of electrical/electronic technology in FCE (T) Bichi have exhibited only 11 applied skills out of the 28 skills highlighted in the study.

Table 1 further shows that, the mean ratings of the responses of the participants of the study on the remaining 17 applied skills have ranged between 1.92 and 2.47; less than the cut-off point value of 2.50 on a 4-point rating scale. This implies that NCE graduates of electrical/electronic technology in public and private organizations do not possess up to 17 applied skills out of the 28 skills highlighted in the study. The data presented in the table have also revealed that the standard deviation values for all the 28 applied skills items were less than 1.96, implying that the responses of the participants of the study are close to the mean and close to one another.

Table 1: Responses of employers of graduates of electrical/electronics education in private and public organizations on the applied skills they possess (N=93)

S/N	Item Statement	X	SD	Remarks
1	Interpret a simple electric circuit diagram: Units of current, voltage, resistance power Ohm's law and Kirchhoff's laws.	2.80	0.841	Possessed
2	Understand electromagnetism: Magnetic flux, force on current-carrying conductors, electromagnetic induction, Fleming's right hand rules and Lenz's Law.	2.34	1.005	Not Possessed
3	Understand the inductance in a d.c.circuit: Self inductance, inductive and non inductive circuits and units of inductance.	2.35	1.146	Not Possessed
4	Understand electrostatics: Structure of atom, electric charges, movement of electrons in a conductor, electrostatic units, capacitors in series and parallel.	2.46	0.962	Not Possessed
5	Understand d.c.machines: equation, armature reaction and efficiency of d.c.machines.	2.45	0.730	Not Possessed
6	Understand d.c. Motors: Speed and torque characteristics, starting speed, d. c. motor control and applications.	2.41	0.710	Not Possessed
7	Understand d. c. generators; Method of excitation, open circuit characteristics, load characteristics of series and shunts generators.	2.25	0.855	Not Possessed
8	Understand the generation of alternating e.m.f: Average and r.m.s values	2.39	0.885	Not Possessed
9	Understand electrical circuits: Single phase, two phase and three phase circuits, circuits with R, Land C series & parallel	2.34	0.866	Not Possessed
10	Understand transformers: Transformer action, transformer tests, the voltage regulations, autotransformers, three phase transformers.	2.55	0.961	Possessed
11	Understand electrical-electronics measurements: Moving coil iron, thermocouple, ammeters, volt-meters, watt-meters, ohmmeter and potentiometer.	2.46	0.618	Not Possessed
12	Understand semiconductor devices: Atomic structure, covalent bonds, n-type, p-type and semi-conductors.	1.92	0.576	Not Possessed
13	Understand electrolysis: Primary and secondary cells, simple voltaic cells, leclanche cell, mercury cells, characteristics of lead-acid and alkaline cells.	2.41	0.711	Not Possessed
14	Understand the field-effect transistors: the junction-field effect transistors, the metal oxide semiconductor field effect transistor, static characteristics and integrated circuits.	2.47	0.716	Not Possessed
15	Understand amplifiers: Small-signal audio frequency amplifiers, negative feedback amplifiers, audio frequency power amplifiers and tuned amplifiers.	2.13	0.726	Not Possessed
16	Design electrical circuit drawing for installation of required points of light: in series and parallel connections	2.52	0.618	Possessed
17	Produce electric cable jointing: T-joints, married joints and Britannic joints.	2.74	0.569	Possessed
18	Install domestic electrical appliances: energy meters, protection devices, fuses and switches.	3.18	0.658	Possessed
19	Install final sub-circuits: including earth continuity conductors to the general mass of the ground.	2.79	0.841	Possessed
20	Install conduit wiring: in domestic and commercial houses using pipes buried in walls and floors.	2.68	0.874	Possessed
21	Install surface wiring: in domestic and commercial houses using required switches, fuses, points of light and cable joints in series and parallel connections.	2.85	0.820	Possessed
22	Install trucking or duct electrical wiring containing many wires at a time-trucking: in series and parallel connections.	2.39	0.886	Not Possessed
23	Install extension board electrical wiring: for use in domestic and commercial appliances.	2.73	0.677	Possessed
24	Install d.c.machines and d.c.generators: in series and parallel connections.	2.47	0.829	Not Possessed
25	Rectify faults in d.c.appliances: d.c.electric machines, d.c.electric motors and d.c.electric generators.	2.61	0.944	Possessed
26	Install domestic electrical appliances: Gold leaf circuits electroscopes, simple electric cookers and circuit alarm bells.	2.43	0.802	Not Possessed
27	Install electronic amplifiers: Simple amplifiers, audio amplifiers, and wide band amplifiers.	2.39	0.723	Not Possessed
28	Rectify faults in: transistor circuits, integrated circuits, and semiconductors.	3.05	0.578	Possessed

Note: X = Mean.

SD = Standard Deviation.

N = Number of Respondents.

Table 2: T-test Analysis of the Mean Ratings of the responses of employers of NCE graduates of electrical/electronics technology in public and private organizations on the applied skills possessed by the graduates they employed.

S/N	Item Statements	Sup of Private N = 68		Sup of Public N = 25		t- Cal	Decision
		X1	SD1	X2	SD2		
1	Interpret a simple electric circuit diagram: Units of current, voltage, resistance power Ohm's law and Kirchhoff's laws.	2.88	0.801	2.56	0.916	1.654	Not Sig.
2	Understand electromagnetism: Magnetic flux, force on current-carrying conductors, electromagnetic induction, Fleming's right hand rules and Lenz's Law.	2.32	1.042	2.40	0.912	-0.324	Not Sig.
3	Understand the inductance in a d.c.circuit: Self inductance, inductive and non inductive circuits and units of inductance.	2.35	1.142	2.32	1.180	0.122	Not Sig.
4	Understand electrostatics: Structure of atom, electric charges, movement of electrons in a conductor, electrostatic units, capacitors in series and parallel.	2.55	0.952	2.20	0.957	1.609	Not Sig.
5	Understand the d.c.machines: Equation, amature reaction and efficiency of d.c.machines.	2.48	0.742	2.36	0.700	0.732	Not Sig.
6	Understand d.c. Motors: Speed and torque characteristics, starting speed, d. c. motor control and applications.	2.36	0.710	2.52	0.714	-0.916	Not Sig.
7	Understand d. c. generators: Method of excitation, open circuit characteristics, load characteristics of series and shunts generators.	2.29	0.829	2.12	0.927	0.869	Not Sig.
8	Understand the generation of alternating e.m.f. Average and r.m.s values	2.36	0.879	2.44	0.916	-0.348	Not Sig.
9	Understand electrical circuits: Single phase, two phase and three phase circuits, circuits with R, Land C series & parallel	2.29	0.864	2.48	0.871	-0.917	Not Sig.
10	Understand transformers: Transformer action, transformer tests, the voltage regulations, autotransformers, three phase transformers.	2.55	0.983	2.52	0.918	0.172	Not Sig.
11	Understand electrical-electronics measurements: Moving coil iron, thermocouple, ammeters, volt-meters, watt-meters, ohmmeter and potentiometer.	2.45	0.609	2.48	0.653	-0.166	Not Sig.
12	Understand semi-conductor devices: Atomic structure, covalent bonds, n-type, p-type and semi-conductors.	1.92	0.606	1.92	0.493	0.048	Not Sig.
13	Understand electrolysis: Primary and secondary cells, simple voltaic cells, leclanche cell, mercury cells, characteristics of lead-acid and alkaline cells.	2.54	0.584	2.48	0.714	0.441	Not Sig.
14	Understand the field-effect transistors: the junction-field effect transistors, the metal oxide semi-conductor field effect transistor, static characteristics and integrated circuits.	2.48	0.680	2.44	0.820	0.269	Not Sig.
15	Understand amplifiers: Small-signal audio frequency amplifiers, negative feedback amplifiers, audio frequency power amplifiers and tuned amplifiers.	2.19	0.738	1.96	0.675	1.368	Not Sig.
16	Design electrical circuit drawing for installation of required points of light: in series and parallel connections	2.44	0.677	2.32	0.802	0.727	Not Sig.
17	Produce electric cable jointing: T-joints, married joints and Britannic joints.	2.70	0.574	2.84	0.553	1.007	Not Sig.
18	Install domestic electrical appliances: energy meters, protection devices, fuses and switches.	3.17	0.645	3.20	0.707	-0.152	Not Sig.
19	Install final sub-circuits: including earth continuity conductors to the general mass of the ground.	2.88	0.801	2.56	0.916	1.656	Not Sig.
20	Install conduit wiring: in domestic and commercial houses using pipes buried in walls and floors.	2.66	0.821	2.72	1.021	-0.283	Not Sig.
21	Install surface wiring: in domestic and						

	commercial houses using required switches, fuses, points of light and cable joints in series and parallel connections.	2.82	0.827	2.92	0.812	-0.501	Not Sig.
22	Install trucking or duct electrical wiring containing many wires at a time trucking: in series and parallel connections.	2.30	0.885	2.64	0.860	-1.611	Not Sig.
23	Install extension board electrical wiring: for use in domestic and commercial appliances.	2.52	0.819	2.32	0.852	1.081	Not Sig.
24	Install d.c.machines and d.c.generators: in series and parallel connections.	2.69	0.717	2.84	0.553	-0.938	Not Sig.
25	Rectify faults in d.c.appliances: d.c.electric machines, d.c.electric d.c.electric generators.	2.57	0.966	2.72	0.890	-0.661	Not Sig.
26	Install domestic electrical appliances: Gold leaf circuits electroscopes, simple electric cookers and circuit alarm bells.	2.45	0.836	2.56	0.711	-0.553	Not Sig.
27	Install electronic amplifiers: Simple amplifiers, audio amplifiers, and wide band amplifiers.	2.44	0.699	2.24	0.778	1.193	Not Sig.
28	Rectify faults in: transistor circuits, integrated circuits, and semi-conductors.	3.04	0.558	3.08	0.640	-0.264	Not Sig.

Key: X_1 = Mean of Supervisors of Private Establishment
 X_2 = Mean of Supervisors of Public Establishment
 SD_1 = Standard Deviation of Supervisors of Private Establishment
 SD_2 = Standard Deviation of Supervisors of Public Establishment
 DF = Degree of Freedom ($68 + 25 = 93 - 2 = 91$)
 t - table (critical) value = 1.96
Level of Significance = 0.05

The t-test analysis presented in Table 2 have shown that the t-calculated (t-cal) values of all the 28 applied skill items in the study have ranged between -1.611 and 1.656; less than the t-table (t-tab) value of 1.96 at $P \leq 0.05$ level of significance and at 91 degree of freedom (df). This implies that there is no significant difference between the mean ratings of the responses of employers of NCE graduates of electrical/electronics technology in private and public organizations on the applied skills possessed by the graduates they employed. Therefore, the null hypothesis of no significant difference for all the 28 applied skills possessed by the graduates is supported.

Findings of the Study

This study has revealed the perception of employers of NCE graduates of electrical/electronics technology in public and private organizations with regard to the applied skills they possess. As perceived by the employers that participated in this study, out of the 28 applied skills highlighted for NCE graduates of electrical/electronics in public and private organizations, the candidates have possessed only 11 while they lacked 17. The applied skills possessed by the candidates are as follows:

- i) Interpreting a simple electric circuit diagram: Units of current, voltage, resistance power Ohm's law and Kirchhoff's laws.
- ii) Understanding transformers: Transformer action, transformer tests, the voltage regulations, autotransformers, three phase transformers.
- iii) Designing electrical circuit drawing for installation of required points of light: in series and parallel connections
- iv) Produce electric cable jointing: T-joints, married joints and Britannic joints.
- v) Installing domestic electrical appliances: Energy meters, protection devices, fuses and switches.
- vi) Installing final sub-circuits: including earth continuity conductors to the general mass of the ground.
- vii) Installing conduit wiring: in domestic and commercial houses using pipes buried in walls and floors.
- viii) Installing surface wiring: in domestic and commercial houses using required switches, fuses, points of light and cable joints in series and parallel connections.
- ix) Installing extension board electrical wiring: for use in domestic and commercial appliances.
- x) Rectifying faults in d.c.appliances: d.c.electric machines, d.c.electric motors and d.c.electric generators.
- xi) Rectifying faults in: Transistor circuits, integrated circuits, and semiconductors

However, the 17 applied skills lacking among NCE graduates of electrical/electronics as perceived by their employers in public and private organizations are as follows:

- i) Understanding electromagnetism: Magnetic flux, force on current-carrying conductors, electromagnetic induction, Fleming's right hand rules and Lenz's Law.
- ii) Understanding the inductance in a d.c.circuit: self inductance, inductive and non inductive circuits and units of inductance.
- iii) Understanding electrostatics: structure of atom, electric charges, movement of electrons in a conductor, electrostatic units, capacitors in series and parallel.
- iv) Understanding the d.c.machines: Equation, armature reaction and efficiency of d.c.machines.
- v) Understanding d.c. Motors: Speed and torque characteristics, starting speed, d. c. motor control and applications.
- vi) Understanding d. c. generators; Method of excitation, open circuit characteristics, load characteristics of series and shunts generators.
- vii) Understanding the generation of alternating e.m.f: average and r.m.s values
- viii) Understanding electrical circuits: Single phase, two phase and three phase circuits, circuits with R, L, C series & parallel
- ix) Understanding electrical-electronics measurements: moving coil iron, thermocouple, ammeters, voltmeters, watt-meters, ohmmeter and potentiometer.
- x) Understanding semiconductor devices: Atomic structure, covalent bonds, n-type, p-type and semiconductors.
- xi) Understanding electrolysis: Primary and secondary cells, simple voltaic cells, Leclanche cell, mercury cells, characteristics of lead-acid and alkaline cells.
- xii) Understanding the field-effect transistors: the junction-field effect transistors, the metal oxide semiconductor field effect transistor, static characteristics and integrated circuits.
- xiii) Understanding amplifiers: small-signal audio frequency amplifiers, negative feedback amplifiers, audio frequency power amplifiers and tuned amplifiers.
- xiv) Installing trucking or duct electrical wiring containing many wires at a time: in series and parallel connections.
- xv) Installing d.c.machines and d.c.generators: in series and parallel connections.
- xvi) Installing domestic electrical appliances: gold leaf circuits electroscopes, simple electric cookers and circuit alarm bells.
- xvii) Installing electronic amplifiers: simple amplifiers, audio amplifiers, and wide band amplifiers.

Overall, we found in this study that holders of NCE certificates in electrical electronics technology in Nigerian public and private organizations have only possessed 11 applied skills out of the 23 applied skills highlighted in the study, implying that they do not possess the remaining 17 applied skills. Similarly, there was no significant difference in the responses of employers of graduates of electrical/electronics technology in public and private organizations. We found our findings to be consistent with extant literature such as Giachino & Gillington(2008) that have revealed graduates' lack of basic technical skills for work and the technical education program's lack of foundation for occupational and work-skills acquisition. Our study has also revealed that there is no significant difference between the mean ratings of the responses of employers of NCE graduates of electrical/electronics technology in public and private organizations on the applied skills possessed by the graduates they employed.

IV. Conclusions

This study concludes that NCE graduates of electrical/electronics in Nigerian public and private organizations are lacking adequate applied skills for them to effectively function in the enterprise. Consistently, the study concludes that there is no significant difference between the mean ratings of the responses of employers of NCE graduates of electrical/electronics technology in public and private organization on the applied skills possessed by the graduates they employed. By implication, this study advocates that policy makers in Nigerian tertiary colleges should ensure that appropriate work-skills are taught in electrical/electronics technology programs at NCE level for the efficiency of the NCE graduates in the enterprise. More importantly, our study has underlined key areas of lapses and gaps in students' knowledge and skills so as to inspire school leaders to make necessary policy adjustments that would address the problems and gaps highlighted.

The study recommends that the applied skills identified be used for improving the existing curriculum of electrical/electronics technology programs of Colleges of Education in Nigeria to enhance the quality of graduates produced by the colleges. The study also recommends that training of electrical/electronics candidates should be based not only on the need of learning institutions but also on the needs of industries. Similarly, the

curriculum content of electrical/electronics technology programs should be directly related to what would make the graduates easily employable. Hence, the study recommends that more emphases should be given to teaching practical skills in Nigerian colleges of education than mere theory.

Further studies can be conducted to investigate how the applied skills possessed by NCE graduates of electrical electronics affect their performance in the enterprise or to assess the teaching competency of electrical/electronics teachers in Nigerian colleges of education.

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