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Students Use of Electricity in Electrical and Electronics Workshop

Umunadi, Ejiwoke Kennedy (Corresponding author)

Technical and Business Education Department

Delta State University, P.M.B.1, Abraka

Tel: +2348062965789 E-mail: kedinad@yahoo.com

Abstract

This paper examined utilization of electricity in electrical and electronics workshop as perceived by undergraduate students in Nigeria. Electrical and electronics are practical and activity oriented subjects that require electricity to function effectively in the workshop and laboratories. It is because of the practical oriented activities that the subject requires electricity supply in electric lamps, motors, wiring and connection of equipment, tools, soldering, indicating instrument and measurement of quantities and resistors and capacitor testing. The other areas in the workshop that require electricity supply are electronic components and devices, rectification circuits, network, radio, television, modulation and maintenance of equipment, gadgets, and the operation of safety equipment in the workshop. Despite the importance of electricity supply for the operation of these workshop equipment in Nigeria, it appears that electricity supply remain a mirage in our school workshop due epileptic power supply in Nigeria. Based on the discussion and implications, the following recommendations were preferred as a way forward: the power sector in Nigeria should be given urgent attention to increase and improve electricity supply by the government to improve on the use of equipment and electrical/electronic tools in Nigeria among others.

Keywords: Electricity, electronics, workshop equipment, electrical workshop

1.0 Introduction

Power applications from the predominant use of electricity in factories, but it is employed also for lighting and for a multitude of purposes to supply heat and motion for industrial and training institution processes, as well as for electrolytic work. Since about 1910 the growth of the use of electricity in factories, institutions and other establishment has risen at an increasing rate and there is now hardly an industrial works where it is not represented. Odhams and Tingling (1979) states that certain industries, such as iron and steel, mining and metallurgy, use enormous quantities of electrical energy but the ordinary factory and institution has perhaps a more varied list of applications.

When electricity is brought into the factory or institution workshop, it is often first employed in the offices, classrooms and for lighting the electrical and electronics workshops. It has' been estimated that electric light alone will save the average user about 100 man-hours of labour per winter and industrial labour season, the

supply of current when connected to users, the progressive worker soon puts it to numerous labour saving uses. In electrical and electronics workshops, there are many applications for power, and the electric motor serves as an ideal prime mover, it is clean in operation, free from objectionable fumes, can be started instantly by the touch of a switch and its operating costs are less than those of most modern paraffin or oil engines. Electricity is also much used for training in institution and industries, especially in electrical and electronics workshop. However the location of institution and factory makes it difficult to get regular supply of electricity or secure a public supply of electricity and contain other circumstances like irregular supply of electricity in Nigeria, a private generating plant may be installed. Such circumstances may be a desire to use a non-standard frequency for special progress work, the existence of a demand for low-pressure steam reasonably coincident in time and quantity with the power load, or the availability of an otherwise waste fuel. In such circumstances the expenditure of capital on a private plant may be well worth while.

Except in the case of a very large or straggling factory an industrial private plant usually generates at "utilization voltage' and distribution system should follow the standard of the public supply of electricity. Public supply of electricity at the moment in Nigeria is still in dilemma. Two thousand megawatts of electricity was generated in 2008 as against the 3,000 generated in 2003. In Nigeria our industries, institutions, agricultural farms and small-scale businesses provide their own private electricity generators, how can they break even in the face of exorbitant production cost essentially because of the lack of steady public power supply? The actualization of a steady electricity supply for industries and institutions remains a great hindrance to the educational, industrial and agricultural sectors of Nigeria. Osakwe, 2009 argues that small scale businesses, farmers and several self - employed Nigerians have been forced to close their investment in various electrical and electronics workshops due to non-availability of power.

It was reported (Tell, December 8 2008) that the worsening Power Holding Company of Nigeria (PHCN) to announce the loss of 800 mega watts generation capacity, within the same period the Sapele power station was completely shut down and the Egbin power in Lagos was operating at reduced capacity. Exactly 10 days after, PHCN reported additional loss of 200 megawatts. Osakwe (2009) stated that all these have been responsible for the 12 hourly zonal power rotational rationing to maintain system stability and ensure even distribution of the limited generation output from the functioning plant. He further stated that under the rotation plan, PHCN divided the country into zones. Each zone gets electricity for 12 hours even this is no guarantee that the electricity light would come. It is obviously impossible in Nigeria at the moment under the rotational plan to get electricity supply to power the equipment in the industry and institutions for effective learning and skill development. It is therefore desirable to investigate the utilization of electricity in the institution and industries as perceived by the undergraduate students in the institutions.

1.1 Statement of the Problem

Electrical and Electronics subjects are practical and activity oriented courses that require supply of electricity to function effectively in the workshops. Electricity utilization in the different workshops in electrical installation, electronics, radio, and television and computer system can save labour and man-hour among other uses of power

in institution in Nigeria. Besides the laudable advantages in electrical and electronics workshop, the actualization of a steady electricity supply for engineering, technology and other associated works in the workshop remained a mirage in Nigeria power sector. Different small-scale business, roadside electricians, radio and television technicians and self-employed computer users and business centers were forced to close their businesses due to epileptic electricity supply in Nigeria.

At the moment in Nigeria, it seems that those electricians and technicians that are interested in investing in electrical and electronic related business are gradually leaving the electrical and electronics profession for quick means of getting money. It is therefore desirable to investigate the ugly trend by looking at the student's perception on the utilization of electricity in electrical and electronics workshop in Nigeria.

1.2 Purpose of the Study

It is based on this therefore, that the study is aimed at investigating the perception of students on the utilization of electricity in electrical and electronics workshops in Nigeria.

i) The different electrical and electronics workshop where electricity can be employed.

ii) Availability of electricity supply to power the equipment in different areas of electrical and electronics workshop.

iii) Effective utilization of electricity in different areas of electrical and electronics subjects.

1.3 Research Questions 1

i) what are the identified electrical and electronics workshop and equipment that electricity could be employed?

ii) What are students' perception on the availability of electricity in different areas of electrical and electronics.

iii) What students' perceptions on the utilization of electricity in different workshops and equipment.

1.4 Hypothesis

There is no significant difference between the mean responses of students' perception on the adequacy and utilization of electricity in electrical and electronic technology workshops.

2.0 Methodology

The study adopted the cross-sectional survey method. The population was made up of the 18, 12, and 24. and 52

students in fourth, third, second and first year of Technical Education Department, Faculty of Education, Delta State University, Abraka in Nigeria in 2009/2010 academic session. These 106 students were group offering electrical and electronic subject that require workshop practice. There was no sampling because of small number of students and research is expected to study the entire population as an intact class. The instrument used was questionnaire. The questionnaire was designed using five-point rating scale. Two -item questionnaires were designed to elicit information using the adequacy and utilization of electricity in electrical and electronic workshop reference points in the questionnaire. The researcher subjected the items of the instrument to face validity by giving the initial pool of the instrument to research professionals and five experts in the field of industrial technical education from Department of Vocational Teacher Education, University of Nigeria, Nsukka and two experts from the Department of Technical and Business Education, Delta State University, Abraka. Cut-off point was based on the grand mean value of the students' perception on the availability and utilization of electricity in electrical and electronics workshops.

3.0 Discussion

It was the opinion of the students that the issue of electricity in the electrical and electronic workshop has been a major problem constituting hindrance during implementation of electrical and electronics programme. A well-articulated electrical and electronic technology programme had been designed by the government to help in the realization of the goals of electrical and electronics in different universities. The results of this present study have revealed to a great extent the state of the art with respect to electricity availability and utilization in education sector. Utilization of electricity in the university workshop, as perceived by undergraduates' students yielded negative results. On a general note, the findings of the study revealed that the curriculum implementation in electrical and electronics workshop using electric lamps, lighting electrical and electronic workshop, electric motor circuits, its enclosure, electric soldering, wiring, connection of electrical and electronic equipment, indicating instrument, measurement of electronic components, devise, rectification circuits, incoming power supply, radio, television electronics circuits, modulation, acoustic, detection, sending and receiving signals, maintenance and testing electronics gadgets, troubleshooting and servicing electrical and electronics materials and appliances, safety in workshop, equipment and serving tools and good housekeeping in electrical and electronics workshop. Furthermore (Orikpe 2006) specified that the curriculum is adequately implemented in the specific areas of knowledge and productive skills identified. The Z-test analysis showed that z-test calculated is less than z-test critical leading to the acceptance of hypothesis. Osuala (1987) stated that the vocational programme must of necessity, provide the students with the knowledge, skills and attitude that will enable them choose, enter into and progress in occupations of their choice. Osuala further explained that the products of technical colleges and vocational institutions are theoretical trained and cannot perform the skills for which they are trained until after a long period of exposure in industry.

Federal ministry of education, science and technology in 1985 decided to enhance the academic performance of students in different institution by equipping the schools with standard equipment and supply of electricity. Okoro (1998) pointed out that the facilities which include the buildings, equipment, tools and school materials available are inadequate for effective use in schools. He further added that in addition to inadequate equipment

and tools, the electricity supply remained a constant problem ravaging the tertiary institution. Oranu (1990) revealed that lack of physical facilities and electricity supply continues to be a problem of tertiary institutions. To achieve the sub-goals of equipping students to live effectively in the age of science and technology. Nwana (1983) states that the practice of starving the schools of electricity for operating the equipment, facilities and fund need to change.

3.1 Power Sector (Electricity in Nigeria)

The power is a strategic sector that can regulate the economy in positive or negative was depending on the rate of supply. Indeed, it represents the most important infrastructure requirement for moving the public, private and other sector of the economy forward. National Economic Empowerment Development Strategy (NEEDS 2005) envisions reforms that will transform the power sector (Electricity) into one led by the private sector, with the role of government primarily in policy transformation and establishment of an appropriate legal and regulatory framework. Full implementation of the NEEDS reforms would eliminate generation deficits, rehabilitate, reinforce and expand transmission and distribution networks, impose payment and collection discipline, and increase rural access to electricity, using grid and off-grid approaches.

Furthermore (NEEDS 2005) specified that Nigeria's power system (electricity) is so inadequate that it has held back economic progress in different sector of the economy and social wellbeing. The system is unreliable and incapable of meeting the demands places on it.

3.2 Implications

The finding is that electricity in the electrical and electronics workshops in the institution as perceived by the students is not regular and inadequate. The practice of the use of workshop equipment and tools for training the students remain a mirage to the institution and government. NEEDS (2005) stipulated that Nigeria's power system is so inadequate that it has held back economic progress and social well-being. The system is unreliable and incapable of meeting the demands placed on it.

This finding is of practical importance to the government, ministry of education, ministry of works and transport and other institution and companies because the study can provide them with the current information on the power sector. The findings revealed related information on the extent of availability and utilization of electricity in institution and industries in order to attain the National Policy on Education. Furthermore, it has created the awareness in the minds of government that for effective implementation of the teaching and learning electrical and electronics skills in these areas.

4.0 Conclusion

Power (electricity) is a strategic sector of the economy of Nigeria; it represents the most important infrastructure requirement for moving both public and private sector forward. For the institution and the industries to move

forward adequate electricity supply must be guaranteed by the government. Based on the results of this study, the researcher concluded that universities and other tertiary institutions and industries requires adequate electricity supply for effective implementation of technical education programme. It is of great importance to maintain constant power supply for effective teaching and learning in technical education workshop, the instructors, and teachers interacts with equipment, machines powered by electricity to organize materials, present oral and practical work by the use of powered devices and computer aided programme to teach some relevant skills and methods. Akamobi & Akabueze, (2006) stipulated that the technical education teacher is expected to deal with the cognitive, psychomotor, and affective outcomes of the subject. The organization and use of electricity makes for good and quality teaching. Electricity supply cannot be neglected in our institution and companies for the attainment of National Policy on Education for technical education in Nigeria. The monitoring of electricity supply and utilization in our institution to accomplish the thrust stated by NEEDs cannot be neglected by the government. Adequate supply will increase rural supply of electricity using grid and off-grid approaches in some local institution and cottage industries. These can encourage the management of the institution and technical education classroom teachers in adopting effective use of electrical and electronics equipment and tools for effective teaching and learning in technical education workshop.

5.0 Recommendations

a) Based on the findings of the study, the following recommendations should be accepted and implemented to resolve the problems of power supply in Nigeria:

b) Develop the capacity to transmit and distribute the higher level of generation of electricity.

c) Government should as a matter of urgency generate 10,000 mega watts a day as demanded for in 2007 from existing plants and new host generation in Nigeria.

d) Government should provide a direct line from the source of generation to the universities and institutions to cater for ever increasing demand for electricity in the institutions and industrial request for electricity supply.

e) Workshops, seminars, conferences and re-training programme should be organized for the higher institution and industrial works to acquaint them with equipment and tools necessary for the training of technical education students. The electricity operated machines should be part of the teaching facilities in workshop.

f) Government should deregulate and liberalize the electricity industry to encourage development and use of alternative energy sources.

References

Akamobo, I. and Akabueze, I.F. (2006). Improvisation of industrial materials in the Teaching of Agricultural Science in Secondary School: Importance, Problems and Strategies for improvement. *Curriculum and Media Technology Research* (CUDIMAC). 2 (1) 26-30.

Federal Republic of Nigeria (2004). *National Policy on Education* (4th Ed). Lagos: Nigeria Educational Research and Development Council (NERDC).

National Economic Empowerment Development Strategy (NEEDS, 2005) *National Planning Commission.* Abuja: Central Bank of Nigeria publication.

Nwana, O.C. (1983). Curriculum designing for the junior senior secondary school. *The Nigerian Principal Journal of ANCOPPS.* 1 (4), 25-33.

Odhams, O. and Tingling, C. (1979). *General Electrical Engineering.* Great Britain: C. Tingling and CO.

Okoro, O.M. (1998). *Programme evaluation in education.* Obosi: Pacific correspondence College Press.

Oranu, R.N. (1990). Teaching NCE teachers for vocational and technical education. Department of vocational and technical education. *Seminar paper* UNN.

Orikpe, E.A. (2006). Adequacy of the NCE Agriculture Curriculum implementation for empowering Youths as competent agricultural science teachers. *A journal* of *CUDIMAC.* 2 (1). 211 - 215.

Orikpe, E.A. (2008). Adequacy of the NCE agriculture curriculum implementation for empowering youths as competent agricultural science teachers. *A journal* of *Curriculum and Media Technology Research* 2(1) 211 - 215.

Osakwe, E. (2009). Navigating the nation through today's shame to tomorrow fame: Social studies as pilot. Inaugural lecture delivered by Professor Emman Osakwe, in the 17th in the series of lecture of Delta State University, Abraka on Thursday, February 26, 2009.

Osakwe, E.O. (2009). Worsening power situation. *Tell Magazine,* December 8, 2008.

Osuala, F.E. (1987). *A handbook* of *vocational technical education for Nigeria.* Obosi: Pacific Publishers.

Notes

Note 1. These are tables explaining research questions 1 to 3

Note 2. The table explaining hypothesis formulated in the study.

Research question 1

What are the identified electrical and electronics workshops area that electricity could be employed?

Table 1. Identified areas and equipment in electrical and electronics Workshop

S/N	Workshop Areas	5	4	3	2	1	$\overline{X}$	SD
1	Electric lamps and lighting in workshop	7	10	16	31	42	2.14	1.23
2	Electric Motor Circuits and Enclosures	12	1.8	10	35	30	2.48	1.36
3	Electric Soldering on Vero boards in workshop	10	15	5	45	31	2.32	1.29
4	Wiring and connection of electrical and electronics equipment using tools and appliances	5	20	23	39	19	2.56	1.13
5	Indicating instrument and measurement of quantity of electricity	8	15	32	31	20	2.62	1.17
6	Resistors and capacitor values measurement and connection	6	25	46	9	20	2.89	1.14
7	Electronics components and devices	20	21	27	10	28	2.95	1.46
8	Rectification circuits, incoming and power supply of electricity	30	20	32	14	10	3.43	1.29
9	Electronics circuits and network of radio and television	11	12	34	40	9	2.77	1.10
10	Modulation, acoustic and detection in communication laboratories	13	22	23	36	12	2.89	1.22
11	Communication as Sending and reception of signals	16	24	12	44	10	2.93	1.28
12	Maintenance and Testing of electronic gadgets	18	30	4	36	18	2.94	1.41
13	Troubleshooting and servicing of electrical/ electronic materials/ appliances	14	25	22	30	15	2.93	1.27
14	Safety in Electrical/Electronic workshops	5	15	18	38	30	2.37	1.38
15	Equipment and servicing tools and good house keeping	28	22	31	5	20	3.31	1.41
Grand Mean							**2.76**	**1.28**

Table I shows workshop areas and specific equipment and devices that electricity can be employed as perceived by electrical and electronic students with minimum mean value of 2.14 and SD = 1.23 and maximum mean value of 3.43 and standard deviation of 1.29 respectively. The Table also reflected the grand mean of 2.76 and Standard Deviation of 1.28 attested by the students.

Research question 2

What are students' perceptions on the availability of electricity in the workshop areas?

Table 2. Responses of students' perception on the availability of electricity in the different areas of electrical and electronic technology workshop

S/N	Workshop Areas	5	4	3	2	1	X	SD
1	Electric Lamps and lighting in workshop	7	10	16	31	42	2.14	1.23
2	Electric motor circuits and Enclosures	12	18	10	36	30	2.49	1.36
3	Electric Soldering on Vero boards	10	15	5	45	31	2.32	1.29
4	Wiring and Connection of Electrical/Electronics Equipment using tools and appliances	5	20	23	.39	19	2.56	1.13
5	Indicating instrument and measurement of quantity of electricity	8	15	32	31	20	2.62	1.17
6	Resistors and Capacitors values measurement and connections	6	25	46	9	20	2.89	1.14
7	Electronics Components and Devices	20	21	27	10	28	2.95	1.46
8	Rectification Circuit, incoming and power supply of electricity	30	20	32	14	10	3.43	1.29
9	Electronics circuits and network of radio and television	11	12	34	40	9	2.77	1.10
10	Modulation, Acoustic and detection in communication laboratories	13	22	23	36	12	2.89	1.22
11	Communication on sending and reception of signals	16	24	12	44	10	2.93	1.28
12	Maintenance and Testing of electronics gadgets	18	30	4	36	18	2.94	1.41
13	Troubleshooting and servicing of electrical/electronic materials/appliances	14	25	22	30	15	2.93	1.27
14	Safety in electrical/electronics workshops	5	15	18	36	30	2.37	1.38
15	Equipment and serving tools and good house keeping	28	22	31	5	20	3.31	1.41
	Grand Mean						2.76	1.28

The minimum mean value is 2.14 and SD of 1.23.
The maximum mean value in Table 2 is 3.31 with standard deviation of 1.41.

The results obtained from Table 2 had a grand mean of 2.78 and standard deviation of 1.28 indicating that electricity is not available in the electrical and electronics workshops and different areas of the subject as attested by the respondents.

Research question 3

What are students' perception on the utilization of electricity in different areas of electrical and electronics workshop?

Table 3. Responses of students perception on the utilization of electricity in different areas of electrical and electronics workshop

S/N	Items	5	4	3	2	1	$\overline{X}$	SD
1	Electric Lamps and lighting in workshop	9	21	39	20	17	2.86	1.17
2	Electric motor circuits and Enclosures	6	18	48	10	24	2.74	1.16
3	Electric Soldering on Vero boards	10	42	18	21	15	3.10	1.24
4	Wiring and Connection of Electrical/Electronics Equipment using tools and appliances	15	8	38	40	5	2.89	1.10
5	Indicating instrument and measurement of quantity of electricity	8	6	20	52	20	2.34	1.09
6	Resistors and Capacitors values measurement and connections	15	6	33	42	10	2.76	1.16
7	Electronics Components and Devices	6	10	20	62	8	2.58	1.55
8	Rectification Circuit, incoming and power Supply of electricity	21	12	22	50	1	3.20	2.28
9	Electronics circuits and network of radio and television	10	14	32	48	2	2.83	1.01
10	Modulation, Acoustic and detection in communication laboratories	7	6	18	68	7	2.42	0.95
11	Communication on sending and reception of signals	12	10	40	43	1	2.90	1.00
12	Maintenance and Testing of electronics gadgets	10	7	12	70	7	2.46	1.04
13	Troubleshooting and servicing of electrical/electronic materials/appliances	13	8	6	76	3	2.55	1.10
.14	Safety in electrical/ electronics workshops	14	10	11	66	5	2.64	1.15
15	Equipment and serving tools and good house keeping	11	10	14	64	7	2.57	1.10
	Grand Mean						2.72	1.21

Table 3 shows that the utilization of electricity had a grand mean of 2.72 and standard deviation of 1.21 It is also attested by the respondents that the utilization of electricity in the workshop areas from the itemized item confirmed the non-utilization of electricity in these equipment and devices in the workshops.

Hypothesis

There is no significant difference between the mean responses of students' perception on the adequacy and utilization of electricity in electrical and electronic technology workshop.

Table 4. Z-test summary on students' perception on the availability and utilization of electricity in electrical and electronics workshop

Responses	Mean	SD	N	Df	Z- Cal.	Z- Crit.	Level of Sign.	Remarks
Availability	2.76	1.28	106	210	0.24	1.96	0.05	Accept Ho_1
Utilization	2.72	1.21	106					

The results obtained from Table 4 revealed that there is no significant difference in the perception of students on the availability and utilization of electricity in electric lamps, lighting workshop, electric motor circuit, its enclosures, electric soldering, wiring, connection of electrical/electronic equipment, indicating instrument, measurement of electronics components, devices, rectification circuits, incoming and power supply, radio, television electronic circuits, modulation, acoustic, detection, sending and receiving signals, maintenance and testing electronic gadgets, troubleshooting and servicing electrical and electronic material and appliances, safety in workshop, equipment and serving tools and good housekeeping in electrical and electronic workshop. In Table 4 Z-cal (0.24) was obtained against the Table value Z-crit. of 1.96 at significance. Since the z-cal is less than the z-critical, there is no significant difference between availability and utilization of electricity in the electrical and electronics workshop and the null hypothesis is accepted as remarked in Table 4.