

**ASSESSMENT OF ELECTRICAL WORKSHOP PLANNING ISSUES
IN TECHNICAL COLLEGES AS A WORK SKILL REQUIREMENT**

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Abstract

This study was designed to identify essentials to be considered in planning electrical installation technology workshops in Technical Colleges in Kaduna State. Three research questions and two hypotheses were formulated to guide the study. The survey method using questionnaire as instrument for data collection was employed. A 28-item questionnaire was used to elicit responses from 210 NTC 3 electrical students and 30 teachers from the electrical installation technology departments of all the technical colleges in Kaduna State. The data collected was analyzed using mean to answer the research questions while t-test was used to test the null hypotheses at 0.05 level of confidence. The findings of the study revealed that, planning of the workshops didn't consider standard specifications and provisions. It was recommended among others that state government should build new workshops with standard specifications, each local government council should contribute towards equipping electrical workshops, the PTA should contribute more than before towards the purchase of training materials for students' practice.

Introduction:

An electrical workshop is a room or building containing tools or machinery where practicals are carried out. It can yet be defined as a place where the learner may experiment, text, construct, dismantle couple, repair, design, imagine and study. Thus one is allow to carry out any form of psychomotor activity directed towards the achievement of a predetermine objective for teaching/learning. School workshop according to Ogunyemi (2002) is the building under which training activities of craftsmen, technicians, technologists and engineers are carried out. A workshop is a place where materials are processed with hand tools, machines and equipment to produce physical products (UNESCO ILO, 2002).

For an electrical workshop to be put in working order for the efficient skill development of the individual, that workshop should meet certain standards.

There are few fundermental guidelines that

should be followed in designing technology education facilities, and adherent to this guidelines should permit effective instruction and future adaptation.(Ezeji2004). The layout and arrangement of the workshop calls for more foresight and planning base on the complicated nature of activities which take place therein. According to Idris (2006), an electrical workshop must be setup to provide effective workspace for a good number of activities. The selection/arrangement of equipment and location of area for electrical workshop should be determined only after a careful study of factors such as; shop size and shape, natural and artificial light, electric power outlets/supply, storage facilities, location and arrangement of auxiliary rooms.

The shop planner needs to take into consideration, the prevailing educational philosophy and emerging philosophy as a result of future changes (as dictated by high technology), expansion and taste. One among the considerations for an electrical workshop is its location. The workshop should be located in a

desirable and suitable place so that shop activities would be free of interruptions. This is supported by Gunmill, 1979b when he stated that workshop shop should be flexible, safe, secure, accessible and organized. The location should be such that even necessary noise will not disturb other school activities such as classes, meetings, etc. Furthermore, the workshop should be located in such a place that will make it conspicuous as this will help provide notice of any unusual condition of the shop. The workers may require from time to time, vocational improvement courses that could bring about retraining for those whose skills may tend to become obsolete as a result of emerging technologies while others may desire improved skills for advancement in their places of work. It is in this regard that Anaemena (1997) stated that, planning should consider the possible inclusion of spaces for evening/part-time programmes for such members of the community that require that.

The size of any workshop is important since a crowded workshop invite disciplinary problems as well as hinder satisfactory progress. Size also is greatly influenced by the activities to be carried out in the shop. The floor area needed will vary with the number of the students and teaching method. According to Kalat (2007), for an optimum pedagogical atmosphere, the size of the class should be limited to 20 or 25 students with each work station occupying a space of 7.2m², in situations where the workshop is already provided, the size of the shop may be a limiting factor in determining the number of students to be admitted into the shop at a time.

Illumination is imperative in any workshop setting, as such, abundant natural light is a must. According to Stal Smith (1987), adequate consideration need to be given to the lighting, air conditioning etc. But direct sunlight or reflected glare which is prone to visual distortion should be avoided. Electric light should be well diffused in the workshop to eliminate glare and shadows. Fluorescent

lamps are the best alternative, provided they are of the proper size and type. Local lighting on individual machines should be used where necessary. The advantage of which is the reduction of eye strain, greater accuracy, increase in speed of work. American standard practice for school lighting recommended that school shops should have at least 30ft candle or 300 lux of illumination on the working surfaces and 50ft candle which is 500 lux for drawing rooms.

Ventilation cannot be underestimated as a consideration for an electrical workshop. This helps to expel dust and fumes caused by blowers, exhaust gases from gasoline motors, fumes from soldering, paint fumes and grinding dust. Breathing air containing a concentration of dust can cause silicosis which is a serious lung disorder. In most cases, the damaging effect of dust from grinding operations does not manifest upon the respiratory system until quite some time after exposure, until many years later.

Nwachuckwu (2006), pointed out that each workshop/laboratory should have two doors located at opposite end of the room. He added that interior doors should be thirty six inches wide and except storage room where double doors may be required for the movement of the materials, projects and machines. While exterior doors to workshops / laboratories may be overhead doors when the learning activities there in require an extra width.

Provision to avert fire hazards should be made by ensuring that fire extinguishers are provided for every shop; at least one of the water type extinguishers should be kept ready for use and a pyrene type for oil fires should be within reach at any moment.

Lack of any or some of these considerations affect student output and limits their capabilities. It is therefore necessary to investigate if these considerations are given proper attention in the planning of electrical workshops in technical colleges in Kaduna State.

Electrical installation technology workshop programme is one of the core programs offered in technical colleges in Nigeria. Similarly, graduates of this programme constitute an

indispensable labour force in almost all industries. Electricity is one of the major ingredient for industrial survival, the use and application of which is constantly changing. Olawepo (1997) and Aluberu (2001) traced the factor that affect the planning of electrical installation technology workshops to lack of considerations in planning, inadequate and unqualified teaching staff and shortage of infrastructural facilities. The paper will examine the considerations that influence the planning of electrical workshops in technical Colleges in Kaduna State.

The main purpose of this paper is to identifies the essentials to be considered in planning electrical workshops in Kaduna State. Specifically, the paper is to find out;

- (1) The considerations made in planning of electrical technology workshops in technical Colleges in Kaduna State.
- (2) The problems encountered in planning of electrical workshops in technical Colleges in Kaduna State.
- (3) The strategies for improving the planning of electrical workshop in technical Colleges in Kaduna State.

RESEARCH QUESTIONS

The paper sought to answer the following research questions:

- (1) What are the considerations made in planning of electrical technology workshops in technical Colleges in Kaduna State?
- (2) What are the problems encountered in planning of electrical workshops in technical Colleges in Kaduna State?
- (3) What are the strategies for improving the planning of electrical workshops in technical Colleges in Kaduna State?

HYPOTHESES

The following hypotheses were formulated to guide the study and were tested

at 0.05 level of confidence.

H_{01} : There is no significant difference between the mean response of the teachers and students of electrical installation department regarding problems of planning electrical workshops in technical Colleges of Kaduna State.

H_{02} : There is no significant difference between the mean response of the teachers and students of electrical installation department regarding the strategies for improving the planning of electrical workshops in technical Colleges in Kaduna State.

METHODOLOGY

Population Of The Study:

The population of the study comprised all the 30 electrical installation teachers and all the 210 NTC3 electrical students of all the electrical department of the technical Colleges of Kaduna State. The entire population was studied.

Instrument

The instrument used for data collection was a four-point like scale questionnaire known as Electrical Workshop Planning Instrument (EWPI). It contained a total of 28 items drafted based on the purposes of the study.

Data collection and analysis

The instrument was administered by hand by the researcher. A return rate of 100% was recorded. Analysis was carried out using mean and average mean to answer research questions while t-test was used to test the null hypotheses. Any item with average mean score of 2.50 and above was considered as agree while the items with average mean less than 2.50 was considered disagree.

RESULTS:

Research Question 1:

What are the considerations made in planning of electrical workshops in technical Colleges in Kaduna State?

Table 1:

Mean Ratings of Responses on Considerations Made in Planning Electrical Workshops.

S/NO	ITEMS	\bar{x}_1 N ₁ =30	\bar{x}_2 N ₂ =210	Gm	Remarks
1	There is a separate workshop for electrical installation	3.10	3.20	3.17	Agree
2	The workshop is isolated from other buildings	2.62	2.67	2.60	Agree
3	The workshop has a motorable road leading to it	2.83	2.50	2.67	Agree
4	20 to 25 students work in the workshop at a time	2.49	2.31	2.40	Agree
5	The space for a workstation is about 7.2m ²	2.41	2.33	2.37	Agree
6	The shape of the electrical workshop is rectangular	2.64	2.70	2.67	Agree
7	The shape of the electrical shop is square with pillars	2.24	2.22	2.23	Agree
8	There is a fluorescent lamp over each workstation	2.67	2.11	2.09	Agree
9	Only natural light that is used in the workshop	2.10	2.20	2.15	Agree
10	There are windows for cross-ventilation	2.64	2.78	2.71	Agree
11	There are wash facilities in the workshop	2.01	2.05	2.06	Agree
12	There are fire extinguishers in the workshops	3.05	2.87	2.69	Agree
13	There are lockers for each student	2.31	2.27	2.29	Agree
14	There is an auxiliary area in the workshop.	2.89	3.10	2.79	Agree

Key: N₁ = Number of teachers; N₂ = number of students
 \bar{x}_1 = mean response of teachers; \bar{x}_2 = response of students
 Gm = Grand mean.

Table 1 revealed that item is rated at 3.17 showing that the workshops are isolated from other buildings. Items 7 and 13 are rated below 2.5 showing that the workshops are not of square shapes and there are no separate lockers for each student.

Research Question 2: What are the problems encountered in planning of electrical workshops in the technical workshops?

Table 2. Mean Responses of Teachers and Students on Problem Encountered in Planning Electrical Workshops.

S/NO	ITEMS	\bar{x}_1 N ₁ =30	\bar{x}_2 N ₂ =210	Gm	Remarks
1	There is electrical power supply to the workshop	3.20	3.40	3.30	Agree
2	PTA does not single handedly provide practical materials	2.71	3.00	2.89	Agree
3	Government did not equip the workshop basis on the number of students	2.12	2.80	2.76	Agree
4	Government did not employ enough teachers	2.93	2.90	2.92	Agree
5	Government did not employ enough workshop assistants	2.77	3.00	2.89	Agree
6	The students per class are usually the same in number with the tools available	2.80	2.72	2.76	Agree
7	Government supply tools after many years	3.38	3.60	3.49	Agree
8	Government lack experts in workshop planning	3.51	3.47	3.49	Agree

Key: N₁ = number of teachers; N₂ = number of students and Gm = Grand mean.
 \bar{x}_1 = mean response of teachers; \bar{x}_2 = mean response of students

Table 2 shows in time 15 that the workshops have electrical power supply connected to them. Item 20 with mean rating of 3.09 revealed that student are more than the tools while item 18 and 19 shows inadequacy of teachers and shop assistants.

Research Question 3: What are the strategies for improving the planning of electrical

workshops in technical colleges in Kaduna State?

Table 3

Mean Responses of Teachers and Students on the Strategies for Improving the Planning of Electrical Workshops in Technical Colleges in Kaduna State.

S/NO	ITEM	\bar{x}_1 N ₁ =30	\bar{x}_2 N ₂ =210	Gm	REMARKS
23	Not only contractors that read electrical are allowed to supply machines.	3.39	3.47	3.43	Agree
24	The teachers are given orientation before they order for machines.	3.28	3.50	3.39	Disagree
25	Government give money to the HODs for materials	2.58	2.56	2.64	Agree
26	The machine tools are absolute	3.39	3.47	2.43	Agree
27	Excursion is use to observe workshop settings of other technical Colleges	2.41	2.13	2.27	Disagree
28	Teachers are not trained on how to plan electrical workshops.	3.34	3.40	3.37	Agree

Key: N₁ = number of teachers, N₂ = number of students

\bar{x}_1 = mean responses of teachers, \bar{x}_2 = mean responses of students Gm = Grand mean.

Table 3 shows that item 25 is rated as 2.64 showing that the student government gives money to the HODs, for the purchase of practical materials. Item 23 and 24 show mean responses of 2.33 and 2.22 indicating that some contractors don't fix the machines themselves and the teachers are not involved in the purchase of machine tools for their workshops.

Hypothesis 1:

There is no significant difference between the mean responses of the teachers and students of electrical installation department reading problems of planning workshops in the technical Colleges.

Table 4
t-test Analysis of the Responses Regarding the Problems of Planning Electrical Workshops in Technical Colleges.

ITEMS	\bar{x}_1	\bar{x}_2	SD ₁	SD ₂	t	Remarks
					1.43	Accept
15	3.20	3.40	0.77	0.49	1.44	Accept
16	2.77	3.00	0.89	0.59	0.38	Accept
17	2.72	2.80	1.15	0.98	0.18	Accept
18	2.93	2.90	0.90	0.62	1.44	Accept
19	2.77	3.00	0.89	0.58	0.37	Accept
20	2.80	2.72	0.55	0.60	1.57	Accept
21	3.38	3.60	0.75	0.49	0.37	Accept
22	3.51	3.47	0.55	0.60		

$P > 0.05$, $df=238$, table value = ± 1.96

Key: N_1 = number of teachers, N_2 = number of students, SD_1 = standard deviation of teachers' mean responses, SD_2 standard deviation of students mean response
t-test = test analysis of the respondents.

The hypothesis was accepted since all items had their values less than the table value.

Hypothesis 2:

There is no significant difference between the mean response of the teachers and that of the students of electrical installation department regarding the strategies for improving the planning of electrical workshops in technical Colleges of Kaduna State.

Table 5:

t-test Analysis of Mean Responses of Teachers and Students Regarding the Strategies for Improving the Planning of Electrical Workshops.

ITEMS	\bar{x}_1	\bar{x}_2	SD ₁	SD ₂	t	Remarks
23	3.39	2.47	0.69	0.47	-0.62	Accept
24	3.28	3.50	0.78	0.50	0.82	Accept
25	2.58	2.56	0.74	0.56	0.81	Accept
26	3.39	3.47	0.69	0.47	0.61	Accept
27	2.41	2.13	0.71	0.52	0.72	Accept
28	3.34	3.40	0.73	0.49	0.44	Accept

$P > 0.05$, $df = 238$, table value = ± 1.96

Key: N_1 = number of teachers, N_2 = number of students.

\bar{x}_1 = mean response of teachers, \bar{x}_2 = mean response of students

SD₁ = standard deviation of teachers response,

SD₂ = standard deviation of students response and t-test = test analysis of the respondents.

The hypothesis was accepted since all items had their t-value less than the table value.

FINDINGS

Based on the data analyzed, it was found out that;

1. The students are over crowded in the classes since they are far beyond 25 per class.
2. The work stations are of small space (area).
3. There is no enough lighting in the workshops.
4. There are no wash facilities in the workshops.
5. No locker space for individual student.
6. Government sent tools to schools without considering the existing number of students.
7. Government did not employ

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4. There are no wash facilities in the workshops.
5. No locker space for individual student.
6. Government sent tools to schools without considering the existing number of students.
7. Government did not employ enough teachers and workshop assistants.

8. Government lack experts in workshop planning.
9. Tools are not supplied to the technical Colleges regularly.
10. The teachers who will handle these machines in class are not involved in the purchase of the machines
11. Most machine tools are absolute.

DISCUSSION OF FINDINGS

The findings of this study revealed that the average number of 25 students per class is neglected in favour of over crowding as indicated by item 4, item 5 also indicate that the work space used is less than 7.2m². This crowded situation affect the teaching/learning as indicated by Kalat (2007) who wrote that, for any optimum pedagogical atmosphere, the sizes of classes should be limited to 25 students with each work station of 7.2m².

The findings show in item 8 that each work station is not illuminated by at least a fluorescent lamp; this may result in poor quality of work as accuracy can be reduced due to poor vision. This of course its less than 300 lux that is recommended by the American standard practice. Item 11 and 13 shows that there are no wash facilities nor lockers for students to keep their work and shop wears. Item 15 shows that electrical power supply is connected to the workshops in readiness for work.

It was also revealed in this study in item 23 that not only contractors that read electrical are allowed to supply machines , couple with the non-orientation of teachers before the purchase of machines, this might be traced to the lake of technical teachers both in quantity and quality as buttressed by Olawepo (1997) and Alubera (2001). we can be sure of the

supply of toys or non-functional machines that will hardly make any appreciable change in the student work skill development.

It was also revealed in items 26 and 28 that the machines available in the colleges are absolute ones and teachers are not trained on how to plan electrical workshops. It is necessary to use modern machines and use modern skill which teachers can acquire at conferences.

CONCLUSION

Work skill requirement in contemporary Nigeria rest on well planned and organized workshops. Electrical workshop planning in particular should be made with adequate considerations for areas of need such as; proper location, size, illumination , ventilation, auxiliary areas and power supply. Lack or absence of these affects students output and limit their capabilities and skill requirement.

RECOMMENDATIONS

Based on the findings of the study the following are recommended for action.

1. Each class should be within the size of 30, with the left cover constituting another class.
2. Lighting and wash facilities should be improved for better vision and cleanliness.
3. Tools should be purchased regularly by government to meet the incidence of wear and tear and also locker space should be provided for individual student.
4. Government should employ more technical teachers and workshop assistants for better teaching and learning.
5. Government should seek the hand of experts when it comes to planning. The Universities can assist well.
6. Outdated or absolute machines should be replaced with modern ones.
7. Teachers should be sponsored to

conferences to brain-storm, acquaint themselves with modern work skills.

8. Government should build new workshops with standard specifications while each local government council should contribute towards equipping the electrical workshops and the PTA should contribute more than before towards the purchase of training material for student practice

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