Evaluation of Students' Academic Competence in Learning Technical Drawing and Workshop Practice in the Department of Electrical Technology Education

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Abstract

The study evaluated the students' academic competence in learning technical drawing and workshop practice in the Department of Electrical Technology Education, Kaduna polytechnic. Descriptive research design was used for the study and the population of the study was the 24 electrical electronic technology students in the department to include fifteen (15) male and nine (9) female students. No sampling was used as the population size was manageable. A well-structured questionnaire, divided into three sections, was used to collect data for the study. The first section collected the biodata of the respondents, and the two other sections, of eight (8) and ten (10) items, respectively, collected their responses. The Research instruments was pilot tested having an internal consistency of 0.75 which was measured using Cronbach Alpha statistics. After validation by three experts in the area of electrical and electronic technology. The data after administering was collected and analyzed using mean to answer the research questions and t-test to test the hypothesis at a 0.05 significance level. The result obtained indicated that students have adequate academic competence in learning technical drawing and workshop practice and no significant difference between the responses of male and female students on their academic competence in learning technical drawing and workshop practice in the department of electrical technology education, Kaduna polytechnic.

Keywords: academic competence, technical vocational education and training (TVET), evaluation, electrical electronic technology, technical drawing, workshop practice.

Introduction

Electrical/Electronic Technology also known as Electrical/Electronic engineering technology (EET) is an engineering technology field that implements and applies the principles of electrical engineering. Like electrical engineering, EET deals with the design, application, installation, manufacturing, operation or maintenance of electrical/electronic(s) systems (Electrical Engineering Technology, 2023). In the field of Electrical-Electronic Technology, students are given fundamental theoretical and practical knowledge about automated industrial systems, such as application, designing, programming and assembling hardware. The general philosophy of the Electrical/Electronic Technology (EET) programme is to produce graduates

with high academic standard and adequate practical background for self- employment as well as being of immediate value to industry and the community in general. EET is regulated in Nigeria by the National Board for Technical Education, NBTE. The NBTE is generally in charge of all TVET programmes in Nigeria.

Technical and Vocational Education (TVE) also known as Technical and Vocational Education and Training (TVET), refers to those aspects of educational processes involving, in addition to general education, the study of technologies and related sciences, as well as the acquisition of practical skills, attitudes, understandings, and knowledge relating to occupations in various sectors of economic and social life (FRN, 2004). This aspect of education covers a diverse field of human endeavors which includes but is not limited to metal work, wood work, agriculture, electrical/electronics, building technology, hair dressing, catering etc. Electrical technology focuses on the design and production of high-voltage systems. Electronic technology is mostly involved in low-voltage applications in which the flow of electrons takes place through semiconductors, rather than conductors or metals (Bright Hub, 2010). In establishing the purpose of TVET, Okorafor and Nnajiofo (2017) said it is meant to impart knowledge and skills for increased efficiency in the world of work, sustainable livelihoods, personal empowerment, and socio-economic development, which enhances proper adjustment in knowledge economies and rapidly changing work environments. TVET also cuts across many levels of education in Nigeria, from the post-primary level to higher institutions (universities, polytechnics, and technical colleges. Some challenges have crippled the nation's hope of producing this needed manpower to drive development through TVET. The most heartbreaking of these challenges was the program's inability to meet its own goals and objectives.

Accordingly, Okoye and Okwelle (2013), explained one of the challenges of TVET in Nigeria as: The absence of clarity of aims and objectives on TVET programs as most professionals in TVET seem not to understand what their professional responsibilities are due to their own poor up-bringing in the field. The popular saying goes that, a teacher does not give what he has not. Some even appear naive about the changes in the labour market and would never want to follow the trend to effect changes in the curriculum. Many teachers and instructors of TVET programs in Nigeria have made it more abstract than practically denying students the privilege of developing the needed skills to compete in the working field after school. Other challenges of TVET implementation as revealed in the study included in the study conducted by Zite and Deebom (2017,) TVET lecturers are poorly remunerated, TVET programmes are inadequately funded, employers are over dependent on paper and certificate qualifications rather than skills, negative perception of Nigerians towards technical education, poor budgeting for TVET, placement of other graduates ahead of TVET graduates in terms of employment and professional certification, employers' dependence on certificates rather than skills, rejection of TVET graduates during professional registrations, and rejected students from other disciplines are always admitted into TVET programmes. Lawal (2018) lamented

that about ninety-five percent (95%) of graduates in Nigeria are not employable and, as such, cannot meet the needs of the reality in the workplace. Lawal called for urgent attention from all concerned to address the trend. These and many more have led to the need to evaluate the TVET program in Nigeria.

Evaluation, plays a crucial role in determining the worth of an educational program. Gjurchinovski, (2018), believed that evaluation is an integral element in the curriculum, taking an important place as a finishing and starting point in the educational process. Gjurchinovski emphasized the importance of evaluation in the educational process, explaining that evaluation can be used to assess educational programs and their quality. Talukder (2021) explained that educational evaluation appraises the extent to which objectives of education have been achieved in a comprehensive manner as it is one of the major parts of total education system. Evaluation always based on the objectives of teaching that means educational evaluation is directly related to the teaching-learning process. It is valuing the extent the students learn in a specific period of time. Talukder further buttressed the relevance of educational evaluation, which is in the diagnosis of the student's strengths and weaknesses, prediction of the student's potential and expertise within a definite area, selection of students for a specific course, grading or ranking the student's performance, providing suitable guidance to the students and among others. This is indicative that educational evaluation is a necessary part of every educational program, and the evaluation of the TVET program, which is the nation's hope out of underdevelopment, is of great consequence and a necessity. Part of this need for evaluation can be achieved by diagnosing the expertise of Electrical/Electronic students in the area of technical drawing and workshop practice in the Department of Electrical Technology Education. To the best of the researcher's knowledge, no study had been carried out in Kaduna Polytechnic to evaluate their academic competence in learning technical drawing and workshop practice

Technical drawing and workshop practice are a few of the core subjects/courses for TVET students. Drafting or drawing was described as the act and discipline of composing drawings that visually communicate how something functions or is constructed (Technical drawing, 2020). Technical drawing is essential for communicating ideas in industry and engineering. To make the drawings easier to understand, people use familiar symbols, perspectives, units of measurement, notation systems, visual styles, and page layout. Patel et al (2021) described workshop practice as the backbone of the real industrial environment, which helps to develop and enhance relevant technical hand skills required by technicians working in various engineering industries and workshops. This course intends to impart basic know-how about various hand tools and their use in different sections of manufacturing industries.

Statement of Problem

Technical Vocational Education and Training (TVET) is designed to offer people the opportunity of improving themselves in their general proficiency, especially in relation to their present or future occupation for national development (Zite & Deebom, 2017). Electrical

Electronics technology, an aspect of Technical Vocational Education and Training (TVET), is concerned with the practical applications of electricity in all its forms, including those in the field of electronics. Technical drawings, sometimes referred to as wiring diagrams in Electrical Electronics Technology (EET), provide visual representations describing electrical systems or circuits, while workshop practice is the actual practice of making the drawing a reality using a combination of tools and equipment within the confines of a workshop.

However, according to Lawal (2018), there has been a gap between the graduates of Electrical and Electronic Technology and the requirements needed to match up in the industry. This prompted the researcher to carry out this study on Evaluation of Students' Academic Competence in Learning Technical Drawing and Workshop Practice in the Department of Electrical Technology Education.

Purpose of the Study

The general purpose of the study was to evaluate students' academic competence in learning technical drawing and workshop practice in the Department of Electrical Technology Education,
Kaduna polytechnic. Specifically, the study sought to determined:

1. Students' academic competence in learning technical drawing in the Department of Electrical Technology Education.
2. Students' academic competence in learning workshop practice in the Department of Electrical Technology Education.

Research Questions

1.What are students' academic competencies in learning Technical drawing in the Department of Electrical Technology Education?

2.What are students' academic competencies in learning workshop practice in the Department of Electrical Technology Education?

Null Hypotheses

1. There is no significant difference between the mean responses of male and female students on students' academic competence in learning technical drawing in the Department of Electrical Technology Education.
2. There is no significant difference between the mean responses of male and female students on students' academic competence in learning workshop practice in the Department of Electrical Technology Education.

Methodology

The study adopted a descriptive research design and was conducted in the Department of Electrical Technology Education, Kaduna Polytechnic, Tudun Wada, Kaduna State. The

population for the study was 24, made up of fifteen (15) male and nine (9) female electrical electronic students in the Department of Electrical Electronics Technology. No sampling was used. The instrument for data collection was a self-structured questionnaire divided into three sections, with one section collecting the respondents biodata and the remaining two sections containing the research items in line with the objectives of the study with a five-point scale (strongly agree, agree, undecided, disagree, and strongly disagree with corresponding values of 5, 4, 3, 2 and 1). Three Experts in Electrical/Electronic Technology validated the research instrument. The internal consistency of the instrument was measured using Cronbach alpha reliability method and 0.76 reliability coefficient value was obtained. Twenty-four (24) research questions were administered and twenty-two (22) were retrieved. Data collected were analyzed using Mean at a decision rule of 3.0 to answer the research questions and independent t-test was used to test the hypothesis at a 0.05 significant level using the Statistical Package for Social Science (SPSS), version IBM 25.0.

Presentation of Results

The result of the analysis is presented according to the research questions and hypothesis guiding the study.

Research Question 1: What are students' academic competencies in learning Technical drawing in the Department of Electrical Technology Education?
Null Hypothesis 1: There is no significant difference between the mean responses of male and female students on students' academic competence in learning technical drawing in the Department of Electrical Technology Education.

Table 1: t-test of difference between mean score of male and female students on students' academic competence in learning technical drawing in the Department of Electrical technology Education, Kaduna Polytechnic

Response Category	M	SD	N	df	SE	t-cal	p	Decision
Male students	3.92	0.20	25	38	0.13	-1.24	0.24	Accept
Female students	3.77	0.29	15					

*Note. M = mean, SD = standard deviation, S.E = standard mean error **p<.05*

Table 1, carries answers for research questions1 and hypotheses 1, From Table 1, the means of the male and female students were 3.92 and 3.77, respectively with corresponding standard deviation of 0.20 and 0.29. The mean response is above the decision rule of 3.0, which is indicative that both respondents agree with the good academic competence of students in technical drawing. The table also reveals that the p-value is greater than the significance level of 0.05. Therefore, the null hypothesis was retained. Thus, there is no statistical significance between the responses of the male and female students on the academic competence of students in learning technical drawing in the department of electrical technology education at a 95%

confidence level. This implies that there is no significant difference between the mean response of male students and that of female students on students' academic competence in learning technical drawing in the Department of Electrical Technology Education.

Research Question 2: What are students' academic competencies in learning workshop practice in the Department of Electrical Technology Education?

Null hypothesis 2: There is no significant difference between the mean responses of male and female students on students' academic competence in learning workshop practice in the Department of Electrical Technology Education.

Table 2: t-test of difference between the mean scores of male and female students on students' academic competence in learning workshop practice in the Department of Electrical Technology Education, Kaduna Polytechnic.

Response Category	M	SD	N	df	S.E	t-cal	P	Decision
Male Students	3.53	0.44	25	38	.197	-1.604	0.13	Accept
Female Students	3.85	0.45	15					

*Note. M = mean, SD = standard deviation, S.E = standard mean error **p<.05*

Table2 carries answers for research questions2 and hypotheses 2, From Table 2, the average mean of male and female students' responses is 3.55 and 3.85, respectively with standard deviation of 0.44 and 0.45 which is greater than the decision rule of 3.0. This reflects the respondents' agreement to the good academic competence of students in workshop practice. Also, the p-value of 0.13 is greater than the 0.05 significance level. The null hypothesis is therefore accepted. The response of male students to students' academic competence in workshop practices in the department of electrical technology education is not statistically different from that of female students at 95% confidence level. This implies that there is no significant difference between the mean response of male students and that of female students on students' academic competence in learning workshop practice in the department of electrical technology education, Kaduna polytechnic.

Discussion of Findings

The study shown there is students have a good academic competence in learning technical drawing. The analysis further indicates there is no significant difference between the response of the male and female students on students' academic competence in learning technical drawing in the department of electrical technology education, Kaduna polytechnic. In line with the hypothesis, the findings of this study support the findings of Sanchez et al (2020). They discovered that most students' skills in technical drawing were moderate. This was conveyed by their high scores in the test conducted, summarized and calculated following the criteria of the Department of Education (DepEd) for Technical Vocational Education. It is

beyond this study to state the extent of student competence in technical drawing as such further research will be recommended to measure address this.

Furthermore, following the data obtained from the mean of students on students' competence in learning workshop practice, it was indicative that students have good academic competence in learning the said subject. The correlation analysis further confirmed no significant difference in the response of the male and female students on the students' competence. The results suggests that students in the department of electrical technology education had a good academic competence in learning workshop practice, this contradicts the work of Abdullahi (2010). He blamed the widening gap between students' educational experiences and the real world of work to students' lack of practical skills needed to create and manage their careers which could be gathered in workshop practice.

Conclusion

The concerns in the minds of many on the competence of students in learning most technical subjects had not been given enough consideration. Evaluation of an educational program had become necessary to measure the consistency of the program in meeting its goals. From the findings of the study, both the male and female students agreed that the students are competent enough in learning technical drawing and workshop practice in the department of electrical technology education and no significant difference exist between the responses of male and female students. The findings have strengthened the department in meeting the standard of the TVET program as described in the national policy of education. Students in the department have the technical skills in technical drawing and workshop practice required to meet the needs of the industry. Hence, the department of electrical technology education, Kaduna polytechnic is still meeting its goal of training the technical manpower required to drive the economy of the nation, which is the goal of technical education.

Limitations

1. The study only used male and female students only as sample. This may introduce prejudice in responses as the students can be bias in their response in order to promote their department.
2. The accuracy of the findings of this study depends to a very large extent on the level of honesty exhibited by the respondents.

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