

TECHNOLOGY EDUCATORS' PERCEIVED MAINTENANCE COMPETENCES FOR OPTIMAL PERFORMANCE OF EQUIPMENT IN TECHNICAL EDUCATION WORKSHOPS IN ANAMBRA STATE

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Abstract

The acquisition of maintenance competences is imperative for optimal performance of equipment in the school workshops and laboratories. The study however, determined technology educators' perceived maintenance competences required for optimal performance of equipment in Technical Education workshops in Anambra State. The study adopted a descriptive survey design and was guided by three research questions. The entire population which comprised 47 Technology educators in Technical Education programme in the State was used since the population was manageable. A structured 18-items questionnaire on a four-point rating scale of very highly required (VHR), highly required (HR), not highly required (NHR) and not required (NR) validated by three experts was used for data collection. The reliability of instrument was ascertained using Cronbach Alpha which yielded the reliability coefficient of 0.80, which was appreciably high for the study. The researchers personally administered the instrument to the respondents through the help of two research assistants in the institutions. Mean statistics was used to analyze the data in tandem with the research questions. Findings of the study revealed among others that the ability to diagnose faults and repair them with the appropriate tools and methods is essential for proper maintenance of equipment in technical education workshops. The researchers concluded that preventive, corrective and computerized maintenance competences are crucial for efficient operation of equipment in Technical Education workshop, and as such, should constitute the basis for students' expositions and learning experience. It was therefore, recommended among others that teachers should imbibe and upgrade their maintenance competences as well as impact such competences in learners for them to be able to apply same in maintaining the equipment in their workshops to ensure sustainability and optimal performance.

Keywords: Technology Educators, Maintenance Skills, Efficient Operation of Equipment, Technical Education

Introduction

Education is a catalyst for the sustenance of individuals as well as the economic, social-cultural and political development of nations. It is universally recognized as an instrument for social, political, scientific and technological advancement, which determines the wellbeing of a state. However, one of the major educational goals is principally, the acquisition of appropriate skills and the development of mental, physical and social abilities and competences as sine qua non for an individual to live and contribute to the development of the society (Federal Republic of Nigeria, FRN, 2013). This, validates the clarion call for quality and effective educational

programmes, such as Technical/industrial Education and other affiliate programmes that are currently offered in educational institutions in Nigeria.

According to European Centre for the Development of Vocational Training (Centre Européen pour le Développement de la Formation Professionnelle) (CEDEFOP) (2012), Technical Education intends to develop craftsmanship, practical experience and practical problem-solving skills and to prepare people for careers in higher level technical, professional and managerial positions through the provision of job-specific skills. Hence, the major goal of Technical Education is to give training and impart necessary skills leading to the production of craftsmen, technicians, and skilled personnel who will be enterprising and self-reliant on graduation (FRN, 2013). In order to fully realize the goal of technical training at the Technical Colleges, government regulatory and supervisory agencies such as the National Commission for Colleges of Education (NCCE) (2012) and National Board for Technical Education (NBTE) (2008) have been able to stipulate the minimum standard for courses offered and instructional materials that should be provided for effective teaching and learning of Technical College courses.

Instructional resources or materials are teaching aids that make the teaching and learning realistic, meaningful and effective. They consist of human and material resources used for effective transfer of knowledge, attitudes and skills for students' understanding of a subject matter. Instructional materials are the resources which may be used by the teacher and learner either in isolation or in combination, formally to facilitate the acquisition of knowledge, skills and morals (Nwaka, 2014). Examples of instructional materials used in Technical Education are computers, internet, e-mail, educational television, instructional television, video equipment, satellite system for distance education, motion pictures, film projectors, slide projectors, flannel board, radio, public address system. Afam (2013) classified instructional materials for Technical Education into tools, equipment, fixed facilities and consumables.

The instructional materials are used to facilitate teaching and learning to be more authentic for students to acquire the relevant technical know-how of the industrial world. Equipment are non-consumable items with a life expectancy of more than one year that make instructional delivery real and interesting. Equipment could be portable or heavy mechanical devices required for technical operations in the laboratories, workshops or field laboratories for skills acquisition (Uzoigwe, 2010). Equipment is fixed or movable items provided in the school to facilitate effective teaching and learning. Equipment can be regarded the instructional backbone for effective teaching in science, technology, engineering and vocational and technical oriented courses, and as such, should be available, adequate and functional in order to foster skill acquisition. This requires the application of requisite maintenance competences to make the equipment functional as well as extend their lifespan.

Possessing requisite maintenance competences is paramount to everyone that uses the equipment in the workshop to ensure optimal utilization of the available equipment. Effective maintenance is required to minimize delays and disruption of the teaching and learning process as a result of efficient performance and breakdown of equipment (Okoye & Okoye, 2015). There are different types of equipment maintenance competences which can be carried out to improve the operational life of equipment used in technical education workshops. Equipment maintenance competences are adopted to keep equipment in a state of efficiency. They include breakdown maintenance, preventive maintenance predictive maintenance, corrective maintenance, computerized management systems, reliability centred maintenance, productive maintenance and total productive maintenance competences.

As regards this study, preventive, corrective and computerized constitute the focus. Preventive maintenance competences are the type of dexterities one possesses to be able to conduct certain tasks such as periodic inspection, lubrication, cleaning and testing of equipment used in the teaching and learning processes to avoid breakdown. These activities are performed on a certain schedule to avoid breakdowns of equipment. The application of this competence

helps to delay possible breakdown and significantly reduce the severity of any breakdown that might occur. Corrective measure strategy is another type of maintenance competence is employed when there is a complete breakdown of equipment. Ogbuanya (2009) averred that corrective maintenance competences are usually more costly than preventive measures because it is performed whenever the equipment stops working or starts failing. More so, Ado (2014) affirmed that corrective maintenance strategy involves fault detection, fault isolation, fault elimination through aligning, calibration, reworking, removing, replacing or renovation. In a nutshell, the basic difference between corrective and preventive maintenance is that a problem must occur before any action is taken.

Computerized maintenance competence involves the use of computer to manage a wide range of information on maintenance workforce, repair schedules and equipment histories. It grapples with the use of computer in the planning, management and administrative procedures, quality assurance, corrective and preventive maintenance procedures, spare parts control, work order control and budgeting services required for effective maintenance of equipment (Okoye, 2019).

Statement of the Problem

Equipment maintenance in Technical Education workshops is the responsibility of the school administration, technology educators and students. This makes it imperative for educators and learners to possess the necessary maintenance competences to ensure optimal performance of the equipment. Unfortunately, paucity of fund and lack of equipment amidst other factors have unleashed a serious handicap which negates the goals of technical education. The study therefore aimed to ascertain how much of these skills are required for students' training and optimal performance of the available equipment in the workshop. This would not only provide empirical evidence but also bridge the knowledge gap in this regard.

Purpose of the Study: The purpose of the study is to determine technology educators' perceived maintenance competences for optimal performance of equipment. Specifically, the study identified technology educators perceived:

1. Preventive maintenance competences for optimal performance of equipment in technical education workshops in Anambra State.
2. Corrective maintenance competences for optimal performance of equipment in technical education workshops in Anambra State.
3. Computerized maintenance competences for optimal performance of equipment in technical education workshops in Anambra State.

Research Questions: The following research questions guided the study:

1. What are preventive maintenance competences for optimal performance of equipment in technical education workshops in Anambra State?
2. What are corrective maintenance competences for optimal performance of equipment in technical education workshops in Anambra State?
3. What are computerized maintenance competences for optimal performance of equipment in technical education workshops in Anambra State?

Methods

The study adopted a descriptive survey research design, and was conducted in Anambra State. The State has twenty-one local government areas with the State capital located at Awka. The people of Anambra State are educationally and entrepreneurially driven. The State has some technical institutions that use machines and equipment in teaching learners who are offering

Technical Education programmes. The population of the study is 47 technology educators; there is no sampling since the population was manageable. The instrument for data collection is a researchers' structured questionnaire titled "Technology Educators Perceived maintenance competences for optimal operation of equipment in Technical Education Workshops (TEPMCOPET)". The instrument was on a 4-point rating scale of very highly required (VHR), highly required (HR), not highly required (NHR) and not required (NR) validated by three experts was used for data collection. The instrument was face- validated by three experts in the field and yielded a reliability coefficient of 0.84. Forty-seven copies of the questionnaire were administered to the respondents in their schools, and retrieved after two weeks, with the help of two research assistants. Out of the 47 copies of the questionnaire administered, only 45 copies were retrieved, representing 96% return rate which was analysed. Statistical mean was used to analyse the data, and decision rule was that questionnaire items with the mean score of 2.50 and above were considered as required while otherwise, not required.

Response	Rating Scale	Real Limit of Numbers
Very Highly Required (VHR)	4	3.50 – 4.49
Highly Required (HR)	3	2.50 – 3.49
Moderately Required (MR)	2	1.50 – 2.49
Not Required (SD)	1	1.00 – 1.49

Results

The results of the analysis done inline with the research questions are shown in the Tables below:

Research Question 1: What are the Preventive maintenance competences for optimal performance of equipment in technical education workshops in Anambra State?

Table 1: Respondents' mean ratings on the Preventive maintenance competences for optimal performance of equipment in technical education workshops in Anambra State

S/N Preventive maintenance competences	X	Remarks
1. Ability to inspect equipment before use	3.60	Very Highly Required
2. Inspecting equipment after use	3.50	Very Highly Required
3. Conducting routine maintenance	3.40	Highly Required
4. Testing for signs of malfunctioning	3.20	Highly Required
5. Lubricating equipment parts regularly	3.70	Very Highly Required
Cluster mean	3.48	Very Highly Required

Data on Table 1 shows that items 1, 2 and 5 are Very Highly Required while 3 and 4 indicated Highly Required. The cluster mean score of 3.48 showed that Technology educators affirmed that preventive maintenance competences are highly required for optimal performance of equipment in technical education workshops in Anambra State.

Research Question 2: What are corrective maintenance competences for optimal performance of equipment in technical education workshops in Anambra State?

Table 2: Respondents' mean ratings on the Corrective maintenance competences for optimal performance of equipment in technical education workshops in Anambra State

S/N	Corrective Maintenance Competences	X	Remarks
6.	Ability to follow proper fault detection procedures	3.55	Very Highly Required
7.	Identifying causes of equipment breakdown	3.36	Highly Required
8.	Showing mastering in fixing faults	3.74	Very Highly Required
9.	Ability to independently handle tools	2.83	Highly Required
10.	Ability to purchase appropriate parts for replacement	2.49	Moderately Required
Cluster mean		3.19	Highly Required

Data in Table 2 reveal that items 6 and 8 are Very Highly Required, and items 7 and 9 are Highly Required while item 9 showed Moderately Required. The cluster mean score of 3.19 implied that Technology educators agreed that corrective maintenance competences are highly required for optimal performance of equipment in technical education workshops in Anambra State.

Research Question 3: What are computerized maintenance competences for optimal performance of equipment in technical education workshops in Anambra State?

Table 3: Respondents' mean ratings on the computerized maintenance competences for optimal performance of equipment in technical education workshops in Anambra State

S/N	Computerized maintenance competences	X	Remarks
11.	Handling of automated machines for repairs	3.81	Very Highly Required
12.	Operating diagnostic machines without supervision	3.91	Very Highly Required
13.	Ability to harmonize analogue and digital information	3.52	Very Highly Required
14.	Ability to evaluate job performance and m/c speed	2.86	Highly Required
15.	Ability to interpret and apply readings from machines	2.85	Highly Required
Cluster mean		3.39	Very Highly Required

Data in Table 3 show that items 11, 12 and 13 are Very Highly Required while items 14 and 15 are Highly Required. The cluster mean of 3.93 upheld that Technology educators concurred that computerized maintenance competences are highly required for optimal performance of equipment in technical education workshops in Anambra State.

Discussion of Findings

Finding of the study showed that Technology educators agreed that preventive maintenance competences could enhance the performance of equipment in the workshop. This was supported by the opinion of Uzoigwe (2010) who is of the view that preventive measures are the maintenance task undertaken by operational staff for the purpose of preventing the breakdown of an equipment. Such task includes: cleaning, testing, inspection, lubricating and routine checks which in the words of Ado (2014) helps in preventing the wear and tear or sudden failure of equipment components. Technology educators need to develop these competencies and use them effectively. This will help in preventing the failure of equipment before it actually occurs thereby minimizing total maintenance costs.

Findings in Table 2 upheld that corrective maintenance competences are required for optimal performance of the equipment in the workshops. This was supported by Ado (2014) who asserted that corrective maintenance strategy involves fault detection, fault isolation, fault elimination through adjusting, aligning, calibrations, reworking, removing, replacing or renovation. This suffices that when all these activities are properly undertaken, it could help to keep the equipment in a good working condition, and ultimately foster the realization of educational goals and imparting requisite skills in technology graduates.

The finding in Table 3 indicated that Technology educators affirmed that computerized maintenance competences are required Technical and Vocational Education graduates to navigate the dynamism of the technological world. This was supported by Ahuja and Kamba (2018) who opined that computerized maintenance competences could contribute in improving communication and decision-making capabilities within the maintenance process. Computerized competences are required to plan and schedule work for efficiency and promptness, hence should be imbibed by technology educators and graduates.

Conclusion

The study underscored the imperative of the acquisition of practical and applied skills towards the overall capacity development of the learners and educators alike, in technical education programmes. As such, the enhancement of competences of personnel for equipment maintenance is very essential in the sustainability and functionality of the equipment. Sequel to the above result, it was concluded that preventive, corrective and computerized maintenance competences could foster optimal performance of equipment in Technical Education workshops.

Recommendations: Based on the findings, the following recommendations were proffered:

1. Preventive, corrective and computerized maintenance competences are highly required for optimal performance of equipment in technology education workshops and laboratories. All concerned individuals in the sector should be encouraged to get acquainted with them so as to avoid bearing unwarranted costs owing to complete breakdown of equipment in schools.
2. Government and other relevant stakeholders in education sector should provide schools with adequate equipment for intensive practical exercises and hands-on learning. This would foster the realization of the objectives of Technology Education for national development.
3. Technology educators and students should in addition to imbibing the rudiments of maintenance competences, practice them in their daily affairs. By so doing, they would become proficient in deploying maintenance competences to improve the longevity and efficiency of their equipment.

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