PROMOTING EFFECTIVE INSTRUCTIONAL DELIVERY THROUGH PREDICTIVE MAINTENANCE OF SCHOOL FACILITIES IN TECHNICAL COLLEGES IN RIVERS STATE

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Abstract
The study examined predictive maintenance practices of school facilities for instructional delivery in technical colleges in Rivers State.. One research question guided the study and one null hypotheses was tested at 0.05 alpha level. It adopted survey research design. The population of the study comprised 104 teachers and students of four technical colleges in Rivers State. The entire population was used for the study since it was not too large and was manageable. Hence, the study did not adopt any sampling technique. A 14 – item structured questionnaire was used as instrument for data collection for the study. Three experts validated the instrument. Cronbach_s Alpha method was used to establish the reliability of the instrument in a pilot test; which yielded a reliability coefficient of 0.80. The instrument for data collection was sent to respondents through research assistants. Data related to the research questions were analyzed using mean and standard deviation. The t-test statistics was used to test the hypothesis at 0.05 level of significance. Findings from the study revealed that predictive maintenance practices on school facilities for effective instructional delivery were applied to a low extent in technical colleges in Rivers Sate. The study recommended among others that, State government should always make fund available in order for heads of schools to carry out predictive maintenance on school facilities.

Keywords: school facilities, predictive maintenance, instructional delivery, technical colleges

Introduction

A nation cannot advance technologically without focusing on human resource development. Effective human capital development can only be achieved through quality education (Anaele, 2010). Most countries of the world are described as developed or advanced, due to their technological feats and maneuver. They achieved it through coordinated quality education.

Education is regarded as a tool or machinery for development. It seeks to develop the minds and character of future citizens, their abilities, skills and potentials in order to equip them for contemporary society. This is obvious because of the roles played by educated people in the development of science, socio-economic and political structure to improve the individual and families in making the society a better place to live. In the light of these values, education today must prepare children to function effectively as adults. Education either formal or traditional exists in every society and utilizes facilities.

The history of school facilities can be traced to the era of the formal system of education. It equally changes with the system of education, even though there are other facilities like money and human resources are required. School facilities form an integral part of the educational system and are observed as a potent factor to qualitative and quantitative education. The importance of teaching and learning on the provision, utilization and maintenance of adequate institutional facilities for effective instructional delivery cannot be over-emphasized. According to Afigbo (2016), Learning can occur through one_s interaction with one_s environment.

The environment here refers to facilities that are available to facilitate students learning outcome. It includes books, audio-visual, software and hardware of educational technology; size of classroom, sitting position and arrangement, availability of tables, size of classroom, siting position and arrangement, availability of tables, chairs, chalkboards, shelves on which instruments for practical are arranged (Farombi, 2018). Farombi further stated that the wealth of a nation or society could determine the level of education in that land; emphasizing that a wealthy society will establish good quality lecturers and learning infrastructures, student learn with ease, thus bringing about effective instructional delivering. Anameze (2011) submitted that there is no effective technical education programme can exist without facilities for learning. This is because facilities enable the learner to develop problem – solving skills and scientific attitudes. Effective school facilities or responsive to the changing programs of educational delivery, at minimum, should provide a physical environment that is comfortable, safe, secure, accessible, well illuminated, well ventilated and aesthetically pleasing. School facilities form an integral part of the educational system and are observed as a potent factor to qualitative and quantitative education. Such facilities represent a learning environment with a tremendous impact on the comfort, safety and performance of the learner.

Adeboyeji (2015) opined that the term covers the school site, the buildings, the playgrounds, the equipment and other material resources provided in the school for effective teaching and learning. School facilities can be defined as comprising of location, weather, lighting, ventilation, floor, space per pupil, health, and safety conditions, play areas, cafeteria and library.

Similarly, Onyedeji et al. (2012), defined school facilities to include the site, the building and other infrastructure. Oyedeji, et al further explained that school facilities embrace permanent and semi-permanent structures which include items such as machine, laboratory equipment, chalkboard and office assistance tools such as brooms and cleaning materials. .Osabon (2013) provided a more comprehensive list of school or educational facilities and grouped them into two, namely;

1. School building: These are tangible structures, which serve as shelter for educational activities. They include among others, classrooms, laboratories, workshops, teachers_ common rooms/offices, toilets, restrooms, reading rooms, dispensaries, libraries, hostels/dormitories, dining halls, assembly hall and staff quarters.
2. Equipment: School equipment refers to facilities or outputs such as machine and tools which ease the operation of academic activities. Various pieces of equipment are required in:

a) Classrooms: For example, desks, chairs, blackboards, cupboards shelves, dusting dusters, washable basins, napkins, teaching aids.
b) Laboratories: For example, physics, chemistry, agricultural science, languages, geography.
c) Workshop: Woodwork, metal works and machinery, electronics/electrical and business studies.
d) Fields/halls: Football, table tennis, volley ball, netball, hockey, short put, high jump stands/crossbars, javelin, hurdles, trophies, jersey, bells, notice boards, etc.

In the context of this study, school facilities can be said to be physical expression of the school programmes and activities. It is a consciously designed and controlled environment with the sole aim of promoting teaching and learning activities within the school. It is putting together of facilities to protect the physical well-being of the individuals associated with the school. School facilities are the operational inputs of the instructional programme that leads to effective instructional delivery.

Instructional delivery, according to Davis (2012) is a special form of communication in which voice, gesture, movement, facial expression and eye contact can either complement or detract from the content. The researcher further added that instructional delivery may include question and answer, if not discussion along with various media options.

Effective instructional delivery according to Anita and Charles (2012) is a structural, systematic and effective methodology for teaching academic skills. They added that it is an unambiguous and direct approach to teaching that includes both design and delivery procedures. The researchers further said that it is characterized by a series of support or scaffolds, whereby students are guided through the learning process with clear statements about the purpose and rationale for learning the new skills with clear explanations and demonstration of the instructional target and supported practice with feedback until independent mastery has been achieved.

Bligh (2019) sees effective instructional delivery as a systematic method of teaching with an emphasis on proceeding in small steps, checking for students_ understanding and achieving active and successful participation by all students. This means that effective instructional delivery is the proper way to transfer of all forms of knowledge to the learner in schools including colleges of education.

An academically successful school must radiate a sense of well-being in its facilities which in turn generate information for positive results. This will lead to effective restoration achieved through good design that addresses the educational needs of the students. Most classrooms are usually overcrowded with up to sixty or more students in the classrooms designed for only thirty or forty students. The chairs and desks are not enough; students therefore engage in sharing chairs, standing up or sitting on windows or broken desks, a situation that generally stalls the teaching-learning process, disrupts the students_ mental activity and militates against the intellectual development of the children especially those technical colleges (Akomolafe, 2013).

Technical colleges are educational institutions established to promote and sustain technical education. According to FRN (2013), technical education is an aspect of the educational process involving in addition to general education, study technologies and related sciences and the acquisitions of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of the economic and social life. Technical Education is a functional form of education, training or pre-training designed to prepare individuals to enter, or continue as paid employment in any recognized occupation and in new and emerging occupations or apart from the total experiences of a person whereby he/she learned successfully to carry on gainful occupation or employment. (Nwokolo, 2010). The researcher_s view technical education as an aspect of education that applies the principle of science and technology to empower its receiver with practiced skills and attitude to succeed in an occupation.

A critical ingredient in the effective implementation of technical education programme in colleges of education is the provision of adequate facilities for good training. According to Eze (2018), the effective preparation of any caliber of students is dependent on the quality of the teachers and the utilization and maintenance of training facilities. Okoro (2016) pointed out that the objective of technical education could only be justified if the products, as individuals can perfectly carry out operations by themselves. This only happen when students are involved in practical during their training. Students practices the skill not only when there are available and adequate facilities such as workshops, laboratories, tools and equipment but also when the facilities are maintained.

Maintenance could be routine and ongoing activities such as daily or weekly, cleaning of the laboratory equipment and facilities, it could be periodic activities such as inspection and lubrication of parts of equipment to ensure continued working condition or corrective maintenance which include activities carried out to fix back failed equipment. It can also involve the security of the equipment and facilities. Security here covers protection from physical damage from pests, fire, rain and others. It also pertains to protection from theft or unauthorized uses. Lecturers should not wait for equipment to breakdown before it is serviced. Report of the need for repair or replacement of equipment must be given to the school authority with the view to making immediate arrangement for the repairs and maintenance to avoid waste and depreciation.

According to Adebojeji (2015), maintenance enhances performance and durability; prevents wastage andcorrects breakdown that could shutdown services. Ihuoma (2015) and Agenyi (2017) identified major types of maintenance, namely: preventive, corrective and predictive maintenance. Others are routine; emergency and structural which are all under preventive corrective and predictive maintenance.

Predictive maintenance is seen to be the use of modern day computer softwares to predict equipment age, manufacturing fault, user demands, quality control and performance indices (Agenyi, 2012). Predictive maintenance is geared towards forecasting when an equipment failure may likely occur .since the primary focus of every maintenance act is the functionality of the equipment, predictive maintenance does not end usually at such projective performances, but

having ascertained the eminent failure. It tends to perform the required maintenance to forestall the failure.

Predictive maintenance borrows the strong points from the first two types but advanced scientific techniques to maximize operating time and eliminate unnecessary work. Equipment is run to a point just short of failure. It is a maintenance techniques designed to help determine the condition of in-service equipment to estimate when maintenance should be performed. This type of maintenance pursues constantly knowing and report the status and operational capacity of the installations by knowing the value of certain variables, which represent such state and operational ability. It requires technical knowledge. Computer software is mostly used to predict equipment failure based on age, user demand and performance measures. The present condition of most facilities in technical colleges in Rivers State could suggest that predict maintenance practices may not fully implemented by the school authority.

Statement of the Problem

Guldiee (2015) observed that despite having government funding, some schools in rural areas reportedly have leaking roofs, gaping holes in windows and floors unreadable white boards, no visual teaching aids and poor libraries for effective teaching and learning in different fields. The author further asserted that Nigerian education has suffered at the hands of a succession of often-brutal military regimes that lacked value for the system resulting to total neglect of school facilities such as laboratory/workshop equipment, buildings, classrooms, space and furniture among others and schools in Rivers State more especially, technical colleges are not exempted. The situation could be averted if predictive maintenance practices are employed. It is based on this background that the study sought to investigate the extent to which predictive maintenance of school facilities for effective instructional delivery in technical colleges in River State is practiced.

Aim/Objectives of the Study

The main purpose of the study was to determine the extent of predictive maintenance practices carried out on school facilities for effective instructional delivery in technical colleges in Rivers State. Specifically, the study sought to:

1. Determine the extent to which predictive maintenance practices are applied on school facilities for effective instructional delivery in technical colleges in Rivers State.

Research Question

The following research question guided the study:

1. To what extent are predictive maintenance practices applied on school facilities in technical colleges in Rivers State.

Hypotheses

The following null hypotheses were tested at 0.05 level of significance

1 Teachers and Students do not differ significantly in their mean ratings on the extent at which predictive maintenance practices on school facilities for effective instructional delivery are applied in technical colleges in Rivers State.

Method

This study adopted the descriptive survey research design. The population of the study will comprise all 104 teachers and students (teachers: 30; students: 74) in the four technical colleges in Rivers State. The entire population was used for the study because the size was not too large. The instrument for data collection for this study was a structured questionnaire titled ―Predictive Maintenance Practices on School Facilities Questionnaires (PMPSFQ). The instrument had two main sections; A and B. Section A contains two items on demographic data of respondents while section B contains 14 items with five point scale of Very High Extent (VHE), High Extent (HE), Moderate Extent (ME), Low Extent (LE) and Very Low Extent (VLE). To ascertain the validity of the research instrument, the researcher submitted draft copies of the instrument alongside with research topics, purpose of the study, research questions and hypotheses to two experts in Vocational and Technical Education from the Department of Technology and Vocational Education in Nnamdi Azikiwe University Awka and Alvan Ikoku College of Education Owerri, and one other expert in measurement and evaluation from the Department of Educational Foundation from faculty of Education, Nnamdi Azikiwe University, Awka. Their inputs were used in modifying the items to acceptance standard; thereby making it appropriate for data collection. To determine the reliability of the instrument, Cronbach Alpha method was used to analyze a pilot study with 10 teachers and 10 students in a technical college in Bayelsa State. The reliability Coefficient value 0.80 was obtained. The researcher through the help of research assistants administered 104 copies questionnaire to the respondents; out of which, 97 copies were retrieved after two weeks for data analysis. Descriptive statistics of mean and standard deviation was used to answer the research questions and determine the closeness of the respondents_ views. Decision on the questionnaire items and research questions were based on mean rating of 3.50 points. Therefore, items with mean ratings of 3.50 points and above were regarded to have to a high extent while items with mean ratings below 2.50 points were regarded to have influenced it to a low extent. The t-test statistical tool was used to test the null hypothesis at 0.05 level of significance. A null hypothesis was rejected where the calculated p-value was less than the 0.05 level of significance; it meant that there was a significant difference between mean responses. Conversely, where the calculated p-value was greater than or equal to the level of significance 0.05; it meant that there was no significant difference and the hypothesis was accepted.

Results

Research Question 1

To what extent are predictive maintenance practices applied on school facilities in technical colleges in Rivers State.

Table 1: Mean Ratings and Standard Deviation on Predictive Maintenance of School Facilities.

N= 97

S/N		Mean	SD	Decision
1.	Facilities spare parts are procured in advance	1.16	.43	Low Extent
2.	There is always clear schedule of duties with job description of maintenance activities in readiness for fault occurance	2.75	.44	Low Extent
3.	Funds are provided for future maintenance use	2.87	.42	Low Extent
4.	The temperature, sound and vibration of facilities are often monitored to avoid failure	2.87	.42	Low Extent
5.	The rotation of machines observed constantly to know when there is need for replacement	2.75	.44	Low Extent
6.	Facilities are replaced totally when they nearly reached their life spam to avoid unforeseen circumstance	1.75	.43	Low Extent
7.	Facilities life span can be extened by painting to save money that would be used to replaced or repair in anticipation of fault occurance	2.00	.13	Low Extent
8.	Screws and bolt are purchased and stored properly to be used when there is need.	2.10	.30	Low Extent
9.	Facility auditing are carried out to ascertain the service history of facilities and be ready for any future fault occurrence.	1.90	.30	Low Extent
10.	Annual budgeting provision for school facilities are made knowing fully well that there will be future need.	1.80	.36	Low Extent
11.	Systematic means of tracking the timing of facilities to indicated the ones that will later develop fault are always carried out	3.00	.35	Low Extent
12.	Areas to be repaired are predicted according to the machines actual health and performance	2.40	.20	Low Extent
13.	Limited funds are kept aside to respond to maintenance needs of schools according to the gravity of their needs	2.00	.20	Low Extent
14.	Lecturers are trained on maintenance software packages to help them predict on failure of facilities.	1.82	0.34	Low Extent
	Cluster Mean	**2.23**	**.35**	**Low Extent**

The data in table 1 shows that almost all the items were rated low extent. Their mean ratings ranges from 1.16 to 2.40 as regards the extent predictive maintenance of school facilities in technical college for effective instructional delivery is applied. The cluster mean of 2.23 indicate that, in the opinion of the respondents, predictive maintenance of school facilities for effective instructional delivery in technical colleges is applied to a low extent. The standard deviations of 0.13 to 0.44 show that the respondents are homogenous in their responses

Hypothesis 1

Teachers and Students do not differ significantly in their mean ratings on the extent at which corrective maintenance practices on school facilities for effective instructional delivery are applied in technical colleges in Rivers State.

Summary of t-test comparison of the mean ratings of teachers and students on the extent of application of predictive maintenance on school facilities

Respondents	N	$\bar{X}$	SD	α df	t-cal	p-value	Decision
Students	74	3.52	.12	0.05	0.39	.062	Not Significant
Teachers	30	3. 50	.14	95			

Data in table 2 show that respondents do not differ significantly in their mean ratings on the extent at which corrective maintenance practices are applied on school facilities for effective instructional delivery in technical colleges with mean scores of 3.52 and 3.50 while the corresponding standard deviation is .12 and .14 respectively. The table indicated a t-value of 0.39, at degree of freedom of 95 and a p-value of .062. Testing at alpha level of 0.05, the p-value is not significant, since the p-value is greater than the alpha value (0.05). Therefore, the null hypothesis is not rejected; hence, teachers and students do not differ significantly in their mean ratings on the extent at which predictive maintenance practices are applied on school facilities for effective instructional delivery in technical colleges in Rivers State.

Discussion

The findings of this study revealed that predictive maintenance practices are carried out to low extent on school facilities in technical colleges in Rivers State. The predictive maintenance practices such as procuring spare parts in advance, carrying facility auditing to ascertain the service history and be ready for any future occurrences, provision of annual budgeting for school facilities for future needs, monitoring of temperature, sound and vibration of facilities to avoid failure were all rated on small extent. Supporting the above findings, Adenuga (2012) opined that maintenance budgets in institutions were not considered as a priority. Adenuga further noted that there is no maintenance policies and strategies put in place prior to maintenance needs.

The findings also shows that teachers and students did not significantly differ in their mean ratings on the extent at which predictive maintenance practices are applied on school facilities for effective instructional delivery in technical colleges in Rivers State The findings contradict Ololube (2017) which revealed that there are disparities between urban and rural schools in terms of predictive maintenance of school facilities. Predictive maintenance practices which are geared towards forecasting when an equipment failure may likely occur have a major role to play in effective instructional delivery.

Conclusion

From the findings of the study and discussion that followed, the study was concluded by the researcher that both technical colleges in urban and rural areas in Rivers State carry out predictive maintenance practices on school facilities for effective instructional delivery to a low extent.

Recommendation

Based on the findings of this study and conclusion reached, it was recommended that State government should always make fund available in order for heads of schools to carry out predictive maintenance on school facilities.

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