

# ASSESSMENT OF PRESENT MAINTENANCE PRACTICES AND MAINTENANCE PRACTICE SCHEDULES INSTRUCTIONAL TECHNOLOGIES USE IN TEACHING AND LEARNING BUSINESS EDUCATION PROGRAMMES IN COLLEGES OF EDUCATION IN ANAMBRA AND ENUGU STATES OF NIGERIA

**ROSE NKECHI UBAKA**

*Department of Office Technology and Management  
Federal Polytechnic, Oko, Anambra State*

## **Abstract**

*The paper assessed the present maintenance practices, and maintenance practice schedules adopted on instructional technologies by Business Education Departments in Colleges of Education in Anambra and Enugu States of Nigeria. Two research questions and two null hypotheses guided the study. The population of the study was 165 lecturers and 10 laboratory attendants in Business Education Departments. A 19-item-structured questionnaire was used for data collection. The questionnaire was validated and used to determine the reliability co-efficient of the instrument using Cronbatch Alpha approach, and 0.84 was obtained as reliability co-efficient. Mean and standard deviation were used to find answer to research questions, while the hypotheses were tested using t-test statistic at the probability level of 0.05. The results of the analysis showed that Business Education Departments adopted the present maintenance practices but inconsistent in keeping to maintenance practice schedules. Based on the findings, it was recommended that the Departments should make deliberate efforts to encourage good maintenance practice schedules. It is also recommended that qualified personnel should be employed to offer regular services on the instructional technologies.*

**Key words:** assessment, present maintenance, maintenance practice schedule, instructional technologies.

## **Introduction**

A sustainable education system from time to time maintains her instructional materials for effective instructional processes, consequently the need to assess the present maintenance practice and maintenance practice schedules adopted on the instructional technologies used in teaching and learning Business Education programmes. Instructional technologies had played several roles in educational process, and as such regarded as a veritable tool for behavioural change in the classroom. As a result of this, using and maintenance of instructional technologies have become an integral part of every aspect of educational system. This is most especially on instructional technologies incorporated in higher institutions for teaching and learning. The school system is assigned with the responsibility to prepare students for the use of these instructional technologies; hence the need to adopt a good maintenance practices on them. This will enable continuous and

unbroken teaching and learning processes. This also entails that to have a positive change in the learner, good teaching must take place; and to bring about good teaching, the lecturers should be able to convey their messages in the simplest, most convincing and practical ways to the learners by integrating instructional technologies.

Instructional technologies are those devices used to support teaching and learning. They are tools that lecturers have at their disposal to collaborate and interact with their students in the classroom setting. They are described as those hardware and software used in classroom for the purpose of instructional process that help to provide exciting learning to the learner, and make the teacher to have creative way of making his work easier (Kurt, 2015). Instructional technologies useful in teaching and learning Business Education programmes include interactive whiteboard (IWB), electronic whiteboard, electric and electronic typewriters, word-processing machine, overhead projector, televisions, videocassette recorders (VCRs), digital versatile disc (DVD), digital versatile disc rewritable (DVD-RW), flash driver (FD), slide projectors, and opaque projectors as well as computers. Others are: digital camera, scanners, photocopying machines, printers, the internet, interactive Television, audio/video conferencing; WebBoard, compact disk (CD) writer, liquid crystal display (LCD), modem, among others. Software tools include Microsoft Word (MSWord), Excel, PowerPoint, Publishers, telecommunications, among others. Artificial intelligence (AI) instrument are not left out. Artificial intelligence is a group of related technologies that attempt to emulate human-like qualities, such as learning, reasoning, communicating, seeing and hearing.

Wilson (2015) asserted that no matter how sustainable a group of assets may have been in the original design and construction, they must be operated responsibly and maintained properly to continue to function as designed. Hence, the core ideology of sustainability and maintenance are directly linked. Omorogbe and Imasuen (2017) stated that the success of students to realize the objective of skill acquisition largely depends on the quality of their teachers who teach and impact these skills. The achievement of this skill-acquisition in turn depends on the adequate maintenance of instructional technologies. Where these are not efficient, the teaching and learning process which provides acquisition of knowledge and skills useful for members of the society becomes unattainable. Also, by this inability of the students to achieve desired knowledge and skills, the purpose of using instructional technologies in classroom to promote effective instructional processes by improving teaching and learning is impaired. The objectives of using instructional technologies as pointed by Wenatchee (2015) are to meet the curricular needs of all learners; teach critical thinking skills and foster creativity.

Present Maintenance practices involve daily activities that are normally carried out by lecturers, students, and laboratory attendants/laboratory technician, before the machines are put to use. These include covering the machines when not in use, cleaning and dusting, oiling and lubricating the machines, among others. Business Education lecturers, students and laboratory attendants participate as members of the school team(s) operating instructional technologies, therefore there is need to create maintenance awareness on various technological resources and operational consequences. The major findings of Uzoigwe (2010) on measures for effective maintenance of Agricultural Science facilities and equipment showed that students and teachers carry out routine maintenance services on machines/equipment and facilities to detect faults. However, the study of Iweh and Ufot

(2012) showed that there was no laboratory technician in each of the institutions studied - Akwa Ibom State College of Education, Afaha Nsit; and University of Uyo, in Uyo. It is laboratory technicians that do basic maintenance and repairs on machines. The laboratory attendants are responsible for cleaning and lubricating machinery, performing basic diagnostic tests, checking performance, and testing damaged machine parts to determine whether major repairs are necessary. Sanbernardino Community College District (2011) outlined the duties of laboratory technician to include issue and maintain records of materials and equipment loaned to students; instructors, and other departments, provides guidance and instruction to students on proper use of computers and related peripheral equipment, et cetera. In a similar study, laboratory technician is classified as a laboratory manager who is primarily responsible for coordinating the hardware and software in computer laboratories; serves as network manager, manages the day to day activities of the laboratory (Surry, 1996 and Hartnell Community College District, 2015).

The study of Beattie (2002) showed that volunteers are pressed into service; teachers with interest in technology are assigned support roles in addition to their other obligations. These volunteered roles are difficult to sustain and maintain because these volunteers are not experts in the maintenance profession. As a result some of these technological devices intended for teaching and learning in Business Education Departments in Colleges of Education are left waste and deteriorate due to poor maintenance services.

Maintenance practice schedules on the hand include determining when and how to effect maintenance practices on the instructional technologies. The purpose of this is to develop an approach to keep machines and equipment working uninterrupted because their failure will affect assets; personnel who use them, and educational process at large. Maintenance schedule is also a useful tool that keeps costs down, and helps to get maintenance done in the most efficient and economical way. In summary it is the arrangement and orderliness in which maintenance practices are carried out on the instructional technologies. It has been proven that irregular repair leads to asset deterioration, a shorter asset lifetime and increased long-term capital cost (Community Association of Maintenance (CAM, Team, (2013). The CAM Team automatically calculates when preventive maintenance and repairs are due for the machines, and informs the organisation of the results. The association works with qualified engineers and other experts to develop the maintenance schedules. Unfortunately, there is no such maintenance team in the departments of Business Education in Colleges of Education studied in Anambra and Enugu States.

In Business Education Departments, the maintenance activities are supposed to be carried out at the beginning of the semester to enable students start practical lectures such as Word-Processing, Computer Application classes; at the middle of the semester to ensure that students have unbroken educational process and to consolidate knowledge and skills; and; before and during semester examinations to guarantee that examinations are completed at the scheduled time, as was obtainable in Federal College of Education (Technical), Bichi – Kano State. The challenge associated with this maintenance schedules is that machine parts for most of the instructional technologies are not locally available. The findings of Akasi and Nwabufor (2016) showed that any minor fault results to taking the machines outside. Also, Azuka (2010) in her study observed that in Nigeria, the major obstacle to optimizing the use of instructional technologies in high school has been the lack of timely technical support. The author further stated that the disabled computers take months to be repaired since no

computer technician is available in the immediate vicinity. Further, Miller and Akume (2009) in their study found indifference attitude in the maintenance of available business studies equipment on the part of government and the school authorities.

It is with this background in mind that the researcher saw the need to assess the present maintenance practices and maintenance practice schedules adopted by the Departments of Business Education in colleges of education in Anambra and Enugu States.

Colleges of education are regulated by the National Commission for Colleges of Education (NCCE), and are charged with the responsibility of training prospective teachers for Nigeria's Basic Education Programmes. These colleges are owned by government (federal and state) and are referred to as public institutions, and those owned by individuals or organizations are referred to as private colleges of education. Business Education or Business Teacher Education is an aspect of vocational and technical education that produces teachers for the Junior Secondary Business Studies in Nigeria.

### **Statement of the Problem**

The use of instructional technologies is indispensable for teaching and learning Business Education Programmes. Instructional technologies are tools that lecturers have at their disposal to collaborate and interact with their students in classroom setting. These facilitate teaching and learning, brings about excitement and motivation to students' interests. It also reduces the teacher's burden of explaining for a very long time for the students to understand. However, these instructional technologies used in educational process are not given adequate maintenance schedule services. DeGrendel (2016) stressed that too often maintenance team decide which tasks to perform based on their present skill sets rather than equipment requirement. Not servicing machines/equipment regularly (or not at all) results in further unexpected equipment/machines failures. This technical competency gaps can cause more hazard on the instructional technologies.

### **Purpose of the Study**

The main purpose of this study is to assess the present maintenance practices and maintenance practice schedules adopted on instructional technologies by Business Education Departments in Colleges of Education in Anambra and Enugu States.

### **Research Questions**

The following two research questions guided the study:

1. what are the present maintenance practices adopted on instructional technologies by Business Education Departments in Colleges of Education?
2. what are the maintenance practice schedules adopted on instructional technologies by Business Education Departments in colleges of education?

### **Hypotheses**

The following three null hypotheses were applied in the study:

HO<sub>1</sub> There is no significant difference in the mean ratings of lecturers and laboratory attendants on the present maintenance practices on instructional technologies adopted by Business Education Departments in Colleges of Education.

H<sub>0</sub><sub>2</sub> There is no significant difference in the mean ratings of lecturers and laboratory attendants on the maintenance practice schedules adopted on the instructional technologies by Business Education Departments.

H<sub>0</sub><sub>3</sub> There is no significant difference in the mean ratings of male and female respondents on maintenance practice schedules adopted on instructional technologies by of Business Education Departments in colleges of education.

## **Methodology**

The study adopted a survey research design and focused on the present maintenance practices; and maintenance practice schedules adopted on instructional technologies by Business Education Departments in Colleges of Education in Anambra and Enugu States, that offer business education programmes. The population of the study consisted of one hundred and sixty five (165) lecturers, and ten (10) laboratory attendants, giving a total population of one hundred seventy five (175). Sampling size was not taken because the population was small enough to cover. Instrument for data collection was a-19-item structured questionnaire. The questionnaire consists of two parts A and B. Part A was used to collect information on personal data of the respondents; while Part B was used to collect data on the assessment of present maintenance practices and maintenance practice schedules on the instructional technologies. The instrument was validated by experts in Business Education Department, and Measurement and Evaluation, from Ebonyi State University, Abakaliki. In order to determine reliability of the instrument, copies of questionnaire were distributed to lecturers and laboratory attendants of Federal College of Education (Technical), Bichi in Kano State. The clusters had reliability co-efficient of 0.80 and 0.87 respectively by using Cronbach Alpha approach. The entire items had reliability co-efficient of 0.83. The instrument was personally administered with the help of research assistants (one from each college), and retrieved a week after with the help of research assistants and collected by the researcher at an agreed time and location. The data generated were analyzed using mean and standard deviation for answering research questions and determining the homogeneity of the respondents' view. T-test statistics was used to test the hypotheses at 0.05 level of significance. Interpretation of the results was based on the real limit of numbers: 0.05 – 1.49 was rated Strongly Disagree (SD), those with 1.50 – 2.49 rated Disagree (D), items with mean rating of 2.50 - 3.49 was rated Agree (A), while items with 3.50 – 4.00 was rated Strongly Agree (SA) respectively. A null hypothesis was accepted when the calculated t-value was lower than the critical t-value. Otherwise, the null hypothesis is rejected.

## **Results**

**Research Question 1:** What are the present maintenance practices adopted on the instructional technologies by Business Education Departments in Colleges of Education?

Data collected to answer the research question 1 is presented in Table 1.

**Table 1: Respondents' Mean Ratings on the Present Maintenance Practices (PMP) Adopted on Instructional Technologies by Business Education Departments (N=175)**

S/N	Item	Mean	Std	Interpretation
1	Machines are covered when not in use.	3.42	0.80	A
2	Instructional technologies are not cleaned properly before use.	2.71	1.19	A
3	Instructional technologies are kept for a long time without being connected for classroom use.	1.30	0.67	SD
4	Students make use of instructional technologies with the assistance of laboratory attendants.	3.70	0.67	SA
5	Students are encouraged to clean the instructional technologies before use.	3.68	0.70	SA
6	Electric machines are operated without instructional manuals.	2.99	1.15	D
7	Laboratory attendant keeps the machines in safe condition.	2.17	1.10	A
8	Photocopying machines are serviced regularly.	2.40	1.09	D
9	Tonner is refilled when they finished.	3.45	0.93	A
10	Minor repairs are carried out by the laboratory attendants.	1.86	1.18	D
	Grand mean	2.87	0.93	A

Source: Research data 2021

From Table 1, the respondents agreed with the statements that machines are covered when not in use; instructional technologies are not cleaned properly before use; and students make use of instructional technologies with the assistance of laboratory attendants. Also students are encouraged to clean instructional technologies before use; and electronic machines are operated without instructional manuals. Laboratory attendant keeps the machines in safe condition after classroom usage. But they strongly disagreed with the statement that instructional technologies are kept for a long time without being connected for classroom use; photocopying machines are not refilled and serviced regularly. Minor repairs are not carried out by the laboratory attendants. The item-by-item standard deviations ranged from 0.67 to 1.19. This implies that while respondents are relatively united in their opinions about some items on present maintenance practices, they are heterogeneous in their opinions about other items. The grand mean of 2.87 is within the mean limit of 2.50 to 3.49. This implies that Business Education Departments keep to the present maintenance practices on instructional technologies.

**Research Question 2:** What are the maintenance practice schedules adopted on instructional technologies by Business Education Departments in Colleges of Education?

Data collected to answer the research question 2 is presented in Table 2.

**Table 2: The Mean and Standard Deviation Results on the Maintenance Practice Schedules Applied on the Instructional Technologies in the Business Education Departments (N=175)**

S/N	Item	Mean	Std	Interpretation
1	Printers are serviced at least once in a semester	2.85	1.13	A
2	Scanners are not serviced at all	3.21	1.1	A
3	Computers are serviced once in every semester.	2.54	1.19	A
4	Worn-out parts of the machines are replaced once in a year.	3.10	1.03	A
5	Anti-virus in the computers is renewed once in year.	3.38	0.98	A
6	Projectors are serviced once every year.	3.11	1.01	A
7	Internet subscription charges are paid once in a year.	2.71	1.08	A
8	Photocopying machines are serviced once in a year.	3.33	1.03	A
9	Interactive whiteboards (IWBs) are serviced every semester.	2.57	1.02	A
		<b>2.97</b>	<b>1.07</b>	A

Source: Research data 202

Table 2 shows the Mean and Standard Deviation for the items on maintenance practice schedules on the instructional technologies. The respondents agreed with all the items raised above. The item-by-item analysis of the standard deviations indicates that they ranged from 0.98 to 1.19. This suggests diverse opinions on maintenance practice schedules. However, the grand mean of 2.97 indicates that Business Education Departments apply maintenance practice schedules on the instructional technologies.

**Hypothesis 1:** There is no significant difference in the mean ratings of lecturers and laboratory attendants on the present maintenance practices adopted by Business Education Departments. Data collected to test the hypothesis is presented in Table 3.

**Table 3: t-test Analysis of Lecturers and Laboratory Attendants Mean Ratings on the Present Maintenance Practices on Instructional Technologies**

Group	N	Mean	SD	Df	t-cal	t-crit	Level of Sign.	Interpretation
Lecturer	165	2.88	0.94					
Lab. Attendant	10	2.91	0.70	173	1.19	1.960	0.05	Significance

Source: Research data 2021

The result on Table 3 shows t-test analysis of the mean ratings by respondents (lecturers and laboratory attendants) on the present maintenance practices on instructional technologies. The t-calculated value of 1.19 is less than the critical t-value of 1.96 at 0.05 level of significance and 173 degrees of freedom. The null hypothesis is accepted.

**Hypothesis 2:** There is no significant difference in the mean ratings of lecturers and laboratory attendants on the maintenance practice schedules adopted by Business Education Departments.

Data collected to test the hypothesis is presented in Table 4.

**Table 4: t-test Analysis of Lecturers and Laboratory Attendants Mean Ratings on the Maintenance Practice Schedules on Instructional Technologies**

Group	N	Mean	SD	Df	t-cal	t-crit	Level of Sign.	Interpretation
Lecturer	165	2.99	0.99					
Lab.								
Attendant	10	2.79	0.57	173	0.94	1.960	0.05	Significance

Source: Research data 2021

The result on Table 4 shows the mean ratings of the respondents (lecturers and laboratory attendants) on the maintenance practice schedules on instructional technologies. The t-calculated value of 0.94 is less than the critical t-value of 1.96 at 0.05 level of significance and 173 degrees of freedom. The null hypothesis is accepted.

**Hypothesis 3:** There is no significant difference in the mean ratings of male and female respondents on the maintenance practice schedules adopted by Business Education Departments.

Data collected to test the hypothesis is presented in Table 5.

**Table 5: t-test Analysis on the Mean Ratings of Male and Female Respondents on Maintenance Practice Schedules Adopted by Business Education Departments**

Group	N	Mean	SD	Df	t-cal	t-crit	Level of Sign.	Interpretation
Male	110	3.16	0.80					
Female	65	2.63	1.12	173	12.14	1.960	0.05	Significance

Source: Research data 2021

The result on Table 5 shows the mean ratings of the respondents (male and female) on the maintenance practice schedules on instructional technologies. The t-calculated value of 12.14 is greater than the critical t-value of 1.96 at 0.05 level of significance and 173 degrees of freedom. The null hypothesis is rejected.

## Discussion

The result of the data analysis revealed that Business Education Department keeps to the present maintenance practices on instructional technologies, though the instructional technologies are not cleaned properly before use; and electronic machines are operated without instructional manuals. Also, laboratory attendants do not carry out minor repairs on instructional technologies, which are a part of their duties. This is contrary to Sanbernardino Community College District (2011), and Hartnell Community College District (2015) which stipulated the duties of laboratory attendants to include minor repairs on the machines and equipment. However, the non performance of this duty may be as a result of inadequate number of laboratory attendants in Business Education Departments, or unavailability of laboratory technicians as found by Iweh and Ufot (2012), that there was no laboratory



technician in each of the institution studied: Akwa Ibom State College of Education, and University of Uyo, in Uyo. The data analysed also indicated no significant difference between the mean responses of lecturers and laboratory attendants on the present maintenance practices.

The result of analysis equally shows inconsistent manner adopted on maintenance practice schedules, which is an approach developed to keep machines and equipment working uninterrupted. The inconsistent manner may be as a result of non-availability of technicians within the environment. The findings of Akasi and Nwabufor (2016) on their study on maintenance practice schedules showed that any minor fault results to taking the machines outside. Equally, Azuka (2010) observed that in Nigeria; that the disabled computers take months to be repaired since no computer technician is available in the immediate vicinity. The data analysed indicated no significant difference in the mean responses of lecturers and laboratory attendants on maintenance practice schedules on the instructional technologies. However, it showed a significant difference in the mean responses of male and female respondents. This means that gender factor influenced their responses. This may be as a result of great difference in number of male respondents (110) against female respondents (65).

### **Conclusion**

Based on the findings of the study, the researcher concluded that the colleges of education studied applied routine maintenance practices and inconsistent maintenance practice schedules on their instructional technologies. More so, gender (male and female) factor is a determinant or influencing factor on the maintenance practice schedules applied on the instructional technologies in the Departments of Business Education.

### **Recommendations**

Based on the findings of the study and the conclusions drawn, the following recommendations were made:

- (1) The Department should make effort to employ in quantity and quality experts or professional technicians in the Departments to clean and handle repairs on the instructional technologies.
- (2) The Department should equally be consistent in servicing the machines and equipment for teaching and learning.

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