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Assessment of maintenance practices of instructional technologies in business education departments in tertiary institutions in Ebonyi state, Nigeria

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Abstract
This study assesses the maintenance practices on instructional technologies in Department of Business Education in tertiary Institutions in Ebonyi State. Two research questions and two research hypotheses guided the study. The population of the study was 315 students and 37 Business Educators from the four tertiary institutions in Ebonyi State. Through stratified random sampling, 132 respondents were selected for the study. The instrument for data collection was a structured questionnaire. Test of reliability of the questionnaire was done using the Cronbach Alpha reliability method which gave a reliability index of 0.75. Mean and standard deviation techniques were used to analyze the data collected while t-test was used to test the hypotheses. Results from the data analyzed showed that preventive maintenance practices and corrective maintenance practices are used in maintaining instructional technologies in Department of Business Education**.** Hypotheses tested shows that there is no significant difference in the mean rating of lectures and students on preventive maintenance practices for instructional technologies in Department of Business Education, there is no significant difference in the mean rating of lecturers and students on the corrective maintenance practices for instructional technologies in Department of Business Education. Based on the findings, the study recommended among others that: preventive, as well as corrective maintenance should be constantly done on those equipment and facilities by school management to prevent damages and complete breakdown of those facilities and equipment in tertiary Institutions, Ebonyi State, Management of in tertiary Institutions, Ebonyi State should employ qualified computer laboratory attendant, computer technician, model office attendant to carry out basic maintenance and repairs on the instructional technologies. Head of Department should ensure that imprest be used on at least minor repairs in the Business Education Department.

Keywords: assessment, maintenance practices, instructional technologies, business education

1. Introduction

Instructional technologies had played several roles in educational process, and as such regarded as veritable tool for behavioural change in the classroom. Maintenance have become an integral part of practically every aspect of daily life. This is more especially on instructional technologies used in higher institutions. 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 these instructional technologies that will enable the continuous and unbroken teaching and learning processes. For a describable change in the learner, good teaching must take place and to bring about good teaching, the teachers should be able to convey their messages in effective ways to the learners using instructional technologies.

Instructional technologies are those devices used to support teaching and learning (Seymoureducate, 2016) [10]. They are tools that teachers have at their disposal to collaborate and interact with their students in the classroom setting. Instructional technologies are also 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) [4]. The Association of Educational Communication and Technology (AECT) cited in Seels and Richey (2010) [9] defined instructional technology as the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning. The use of instructional technologies has an impact on students' content acquisition and also adds to class performance. According to Costley (2014) [2], it gives students opportunities to collaborate with their peers resulting in learning from each other. Teaching and learning with technologies in the classroom provide students with a wide range of knowledge and skills in the development and maintenance of quality instructional technology programmes.

Instructional technologies used in teaching and learning Business Education programmes include interactive whiteboard (IWB), electric and electronic typewriters, electronic whiteboard, overhead projector, televisions, VCRs (videocassette recorders), digital versatile disc (DVD), digital versatile disc rewritable disc (DVD-RW), flash driver (FD), slide projectors, and opaque projectors as well as computers, various software applications, digital camera, scanners, photocopying machines, printers, the *internet*, interactive Television, audio/video conferencing, artificial intelligent (AI) (which is a group of related technologies that attempt to develop machines to emulate human-like qualities, such as learning, reasoning,

communicating, seeing and hearing), Web Board, CD (compact disk) writer, LCD (liquid crystal display), modem, among others. While software tools are Word Processing, PowerPoint, spreadsheet, and telecommunications, among others. The instructional software sometimes may be poorly utilized by lecturers of Business Education due to lack of appropriate skills or instructional technologies not being in a good state of use as a result of poor maintenance practices adopted by the Department. When these instructional hardware and software are not regularly maintained, it may prevent their maximum operations and also affect effective educational processes. Audu, and Umar (2013) [1] reported that poor maintenance practices in Nigerian higher institutions hinders effective teaching and learning, making the process rigorous and uninteresting to students and teachers.

Gordon, Seigha, and Akinleye (2019) [7] noted that we live in an era of accountability, it is imperative that the maintenance of instructional technologies for teaching and learning be assessed from time to time. Assessment is an integral part of instruction, as it determines whether or not the goals of education are being achieved. In education, the term assessment may be referred as the wide variety of methods or tools that educators use to evaluate, measure, and document the academic readiness, learning progress, skill acquisition, or educational needs of students. According to Okoli (2012) [6], assessment is the systematic collection, review, and use of information about educational programmes undertaken for the purpose of improving learning and development.

Assessment in relation to maintenance practices is an action or an instance of making a judgment about equipment/machines. This is very important for tracking progress, planning next steps, reporting for future repairs and maintenance in general. Rufai, Umar and Idris (2013) [1] noted that assessment provides diagnostic feedback, helps educators set standards, evaluates progress, and motivates performance. Assessment of instructional technologies will therefore help determine how effective the machines and equipment in use will assist in achieving the instructional objectives.

Maintenance practice is the progressively overseeing resources so that the organization does not experience downtime from broken equipment or waste money on inefficient maintenance procedures. According to Audu and Umar (2013) [1] the primary objectives of maintenance practices in an organisation are: to schedule work efficiently, control costs and ensure regulatory compliance of the equipment/machines. In summary, maintenance is any work that is done regularly to keep a machine or building or piece of equipment in good condition and working order. It is the continuation or preservation of something unchanged or unimpaired. These include preventive (planned) maintenance, corrective maintenance, adaptive maintenance, perfective maintenance, predictive maintenance and periodic maintenance practices. But for the purpose of the study, the study will consider preventive maintenance and corrective maintenance practice.

Preventive or routine maintenance is a daily maintenance (cleaning, inspection, oiling and re-tightening), design to retain the healthy condition of equipment and prevent failure through the prevention of deterioration, periodic inspection or equipment condition diagnosis, to measure deterioration (Iweh & Ufot, 2012) [3]. Routine or preventive maintenance is usually planned and this includes educational inspection, repairs and replacement to make machines continuous to work. It is carried out regularly or after inspection in order to keep the equipment/machines in working condition. Stosic (2015) described preventive maintenance as techniques that help determine the condition of in-service equipment in order to predict when maintenance should be performed. It is further divided into periodic maintenance and predictive maintenance. Uzoigwe (2010) noted that maintenance practice adopted by Business Education Departments in tertiary institutions in order to keep the instructional technologies in perfect teaching and learning condition. These actions include: dusting machines before using them, covering them whenever not in use, not keeping ink in printer unutilized for a long time, oiling or lubricating machine regularly, for example, typewriters required constant oiling and lubrication to enable them function smoothly and effectively. Preventive maintenance is also a schedule of planned maintenance actions aimed at the prevention of breakdowns and failures. The primary goal here is to preserve and enhance equipment reliability, and also keep machines and equipment as reliable as possible. According to Sheu and Krajewski (2014) [11], the intention of this maintenance practice is to build a system that will find potential failures, make change or repairs and prevent failure. Predictive and preventive maintenance will equally stop problems before they start manifesting. It can also help to prevent costly emergencies. It is most effective when it is done regularly and consistently. Sheu and Krajewski (2014) [11] noted that when a preventive maintenance practice is established and streamlined, it works well for the entire College.

Corrective maintenance is the type of maintenance used for equipment after equipment breakdown or malfunctioning is dictated. Corrective maintenance is needed when things go wrong or breakdown occurs demanding reactive action to be taken to get the things up and running again. Good example is when photocopying machine suddenly breaks down while being in operation and stops functioning; the corrective maintenance can be arranged. Conducting effective corrective maintenance on instructional technologies is essential. Sheu and Krajewski (2014) [11] in their study on Decision model for corrective maintenance found out that corrective maintenance practices is ignored in most organisations. There is always the possibility that the critical processes may fail and remedial measures must be taken, hence not only preventive maintenance practices be focused on but also corrective maintenance practices. According to Gordon, Seigha, and Akinleye (2019) [7] corrective maintenance practices performed in Business Education Departments in tertiary institutions are: servicing typewriters for examination purposes, repairing typewriters in preparation for accreditation, repairing typewriters when they locked up and stop functioning, repairing photocopying machines when they are broken and stopped functioning, when the internet service providers disconnect internet services in the College due to the College inability to pay for the subscription charges, when computers are locked up by virus before renewing or updating antivirus, among others.

In Business Education Departments in tertiary institutions in Ebonyi State, the areas that specifically require constant check may include unplugged the electrical/electronic equipment and machines after use. Also leaving them

exposed to dust and dirt penetration; thrusting them in the hands of untrained staff, and not cleaning equipment/machine down before use can cause downtime of the equipment. Again, allowing students in the laboratory without a guide or laboratory technician or laboratory attendants may give rise to wrong manipulation of the hardware and wrong application of software which would affect the instructional technologies negatively and obstruct teaching and learning process. This wrong manipulation of the instructional devices may require maintenance action to prevent machines and equipment from failing, need to repair dreadful conditions experienced with the operation to keep them fit for regular operation.

According to Gordon, Seigha, and Akinleye (2019), maintenance of instructional technologies in Business Education in tertiary institutions is everybody's business; lecturers, students, laboratory computer technicians, laboratory attendants, even other non-teaching staff. Accordingly, maintenance in Business Education in tertiary institutions calls for concerted efforts of administrators, teachers, students, parents and the community because money, technical know-how, planning, organisation and commitment by all concerned are crucial for effective implementation of Business Education in tertiary institutions in Nigeria. Unfortunately, in Departments of Business Education in tertiary institutions in Ebonyi State, the researcher have not seen the management of the institution effort in adopting good maintenance practice as ICT technical experts are not part of staff employed in Business Education Departments. Consequently, their services are lacking, as a result the instructional technologies supplied to tertiary institutions in Ebonyi state are not carefully maintained resulting to dysfunctional. The poor utilization of these educational technologies, may be as a result of poor skills possessed by some teachers and students (Okoli, 2012) [6], or poor maintenance practices on the teaching and learning technologies as pointed out by Nwosu and Azih (2012). It is based on the aforementioned problems that the researchers is motivated to assess the maintenance practices of instructional technologies in Departments of Business Education in tertiary institutions in Ebonyi State

1.2 Statement of the problem

The use of instructional technologies is very important in teaching and learning in Business Education Programme. They make teaching and learning interactive and motivate the learner as well. In fact, instructional technologies change the way teachers teach, offers educators effective ways to reach different types of learners and assess students' understanding through multiple means. When the instructional technologies are properly maintained and utilized, they enhance the relationship between teachers and students. Maintenance practices are therefore imperative on these technologies because they help in keeping the equipment, machines and other teaching and learning devices in a state of maximum efficiency with economy.

However, the study of Nwakpa (2005) [5] revealed that school facilities which include instructional technologies in Colleges of Education were not properly maintained. Some other studies showed that tertiary institutions do not adopt good maintenance practices for instructional technologies supplied to them because they do not have laboratory attendants or laboratory technicians, which is part of maintenance practice of instructional technologies to enhance teaching and learning. These make the instructional technologies to develop problems from time to time because they are neglected, and no professional to check and monitor them to ensure that they are fully utilized for teaching and learning process. Thus they accumulate dust and dirt, and weak in functionality, and therefore begging for maintenance attention. When machines and equipment in schools are inadequately maintained, they constitute health hazards to students and teachers who use them. The problem of the study is that instructional technologies in tertiary institutions in Ebonyi State seem not to be maintained by the management of the institutions. It is on this basis that the researchers set out to assess the maintenance practices of instructional technologies in Business Education Departments in tertiary institutions in Ebonyi State.

1.3 Purpose of the study

The main purpose of this study is to assess the maintenance practices for instructional technologies in Department of Business Education in tertiary institutions in Ebonyi State. Specifically, the study aimed to:

1. Determine the preventive maintenance practices for instructional technologies in department of Business Education in tertiary institutions in Ebonyi State.
2. Ascertain the corrective maintenance practices for instructional technologies in Department of Business Education in tertiary institutions in Ebonyi State.

1.6 Research Questions

The following research questions guided the study:

1. What are the preventive maintenance practices for instructional technologies in Departments of Business Education in tertiary institutions in Ebonyi State?
2. What are the corrective maintenance practices for instructional technologies in Departments of Business Education in tertiary institutions in Ebonyi State?

1.7 Hypotheses

The following two null hypotheses were formulated to guide the study:

$H0_1$ There is no significant difference in the mean rating of Business Educators and students on the preventative maintenance practices in Departments of Business Education in tertiary institutions, Ebonyi State.

$H0_2$ There is no significant difference in the mean rating of Business Educators and students on the corrective maintenance in Departments of Business Education in tertiary institutions in Ebonyi State.

3.0 Methodology

The study adopted a survey research design. Survey research design is suitable for this study because it will make use of questionnaire for data collection from the respondents on maintenance practices of instructional technologies in Business Education Departments in tertiary Institutions, Ebonyi State. The study was conducted in Ebonyi State. It is a state in South Eastern part of Nigeria. The population of the study comprise of 315 students and 37 Business Educators from the four tertiary institutions in Ebonyi State. The institutions are Ebonyi State University, Abakaliki, Ebonyi State College of Education Ikwo, Alex-Ekwueme Federal University Ndufu Alike Ikwo, and Akanu

Ibiam Federal Polytechnic, Uwanna. All the lecturers were used while a sample of 95 students was uses giving a total of 132 respondents. Stratified random sampling technique was used. Thirty percent of students were selected through randomization from each tertiary institution. Structured questionnaire "titled" Assessment of Instructional Technologies Maintenance Practice questionnaire (AITMPQ)" was designed and used for data collection. The questionnaire was structured on 4 – point rating scale as follow: SA = Strongly Agree, A = Agree; D = Disagree and SD = Strongly Disagree, respectively**.** The instrument was validated by two experts in Business Education. The questionnaire was made up of two parts, A and B. Part "A" was designed to elicit information on the background of the respondents while part B has two sections with 17 items. In order to establish the reliability of the instrument, 20 copies of the questionnaire was distributed to Business Education students outside the studied area. Their responses were correlated using Cronbach Alpha, a reliability co-efficient of 0.75 was established. One hundred and thirty two (132) copies of the questionnaire were distributed to the respondents with the help of four trained research assistants. However, out of 132 copies of the instrument distributed, 81 were returned and actually used for data analysis of the study. Mean and standard deviation were used to answer the research questions while t-test was used to test the hypotheses at 0.05 level of significance. Any item with a mean rating of 2.50 or above was regarded as accepted while mean rating less than 2.50 was regarded as not accepted. For the hypotheses, any item with t-calculated value greater than critical value was rejected; otherwise the hypothesis of no significant difference was accepted.

5. Results

Research Question One: What are the Preventive Maintenance Practices in Department of Business Education in tertiary institutions in Ebonyi State.

Table 1: Mean Responses of Respondents on **Preventive Maintenance Practices in Business Education Departments in tertiary institutions in Ebonyi state**

S/N	Preventive Maintenance Practices	SA	A	D	SD	X	SD	Remarks
1	Dusting machines before using them	38	19	16	8	3.07	1.03	Agree
2	Covering them when not in use	26	19	14	22	2.60	1.20	Agree
3	Not keeping ink in printer unutilized for a long time,	11	12	4	54	1.75	1.14	Disagree
4	Oiling machine regularly to enable them function effectively	18	13	7	43	2.07	1.14	Disagree
5	Replacement of machine parts when necessary	13	16	4	48	1.92	1.20	Disagree
6	Re-tightening the machines	31	37	5	8	3.12	0.91	Agree
7	Replacing faulty components,	30	22	8	21	2.75	1.21	Agree
8	Maintain routine services of equipment and facilities to detect faults	21	35	22	3	2.91	0.82	Agree
9	Installing new versions of the operating system,	32	24	21	4	3.03	0.92	Agree
10	Monitoring the functionality of equipment	34	21	16	10	2.97	1.06	Agree
	Grand Mean					**2.76**	**1.06**	**Agreed**

The analysis in Table 1 reveals that out of ten items statement, seven item statements received mean ratings above the cut-off point of 2.50. The mean ratings of these items range from 2.91 to 3.12 while three items received mean below cut-off point. Therefore, the respondents disagreed in three items and agreed on all the seven items as preventive maintenance practices in Business Education Department in in tertiary Institutions, Ebonyi State

Research Question Two: What are the corrective maintenance practices for instructional technologies in Department of Business Education In tertiary institutions in Ebonyi State?

Table 2: Mean Responses of Respondents on corrective maintenance practices for instructional technologies in Departments of Business Education in tertiary institutions in Ebonyi state

S/N	Items Statements	SA	A	D	SD	X	SD	Remarks
11	Servicing computer for examination purposes	41	22	13	5	3.22	0.93	Agree
12	Servicing typewriters for examination purposes,	39	12	25	5	3.04	1.02	Agree
13	Installing new versions of the operating system in computer	38	19	18	6	3.09	0.99	Agree
14	Repairing typewriters in preparation for accreditation,	21	29	14	17	2.66	1.08	Agree
15	Repairing computers in preparation for accreditation	26	32	9	14	2.86	1.05	Agree
16	Testing damaged machine parts to determine whether major repairs are necessary	28	7	26	10	2.90	1.13	Agree
17	Repairing photocopying machines when they stop functioning,	26	19	13	23	2.59	1.21	Agree
	Grand Mean					**2.87**	**1.05**	**Agreed**

The analysis in Table 2 reveals that the mean responses range between 3.22 to 2.71 which is above the cut-off point of 2.50. This indicate that lecturers and students in Department of Business Education agreed on all the items as a corrective maintenance practices for instructional technologies in Department of Business Education, in tertiary institutions in Ebonyi State.

Table 3: T-test Analysis on the Difference Between the Responses of Business Educators and Students on the Preventative Maintenance Practices Adopted by Business Education Departments

Gender	N	Mean	SD	DF	T.cal	T. crit.	Decision
Business Educators	32	2.86	1.05	79	1.69	1.96	NS
Students	49	3.25	0.99				

The data in the Table 3 reveals that the calculated t-value of (1.69) is less than the critical t-value of 2.000 at 79 degree of freedom and 0.05 level of significance. This shows that there is no significant difference in the mean rating of Business Educators and students on the preventive maintenance practices in Departments of Business Education, in tertiary institutions in Ebonyi State.

Table 4: T-test Analysis on the Difference Between the Responses of Mean Rating of Business Educators and Students on the Corrective Maintenance Practices Adopted by Business Education Departments in Tertiary Institutions, Ebonyi State

Gender	N	Mean	SD	DF	T.cal	T. crit.	Decision
Business Educators	32	2.71	1.21	79	0.66	1.96	NS
Students	49	2.87	0.87				

The data in the Table 4 reveals that the calculated t-value of (0.66) is less than the critical t-value of 2.000 at 79 degree of freedom and 0.05 level of significance. This shows that there is no significant difference in the mean rating of Lecturers (Business Educators) and Students on the corrective maintenance in Departments of Business Education, in tertiary Institutions, Ebonyi State

6. Discussion

The study indicated that students agreed that dusting machines before using them, covering them whenever not in use, performing basic diagnostic tests, re-tightening the machines, replacing faulty components, monitoring the condition of networks, Identification of faulty equipment, backing up stored files in computer, maintain routine services schedule of equipment and facilities to detect faults, monitoring the condition of networks, redeploying equipment, updating/upgrading hardware, updating/upgrading software, installing new versions of the operating system, monitoring the functionality equipment and disagreed on replacement of machines parts to make it work effectively, oiling or lubricating machine regularly to enable them functions effectively, not keeping ink in printer unutilized for a long time are preventive maintenance practices in Department of Business Education in tertiary Institutions, Ebonyi State. This finding is in consonances with work of Sheu and Krajewski (2014), the intention of this maintenance practice is to build a system that will find potential failures, make change or repairs and prevent failure. Predictive and preventive maintenance will equally stop problems before they start manifesting. It can also help to prevent costly emergencies. It is most effective when it is done regularly and consistently. Sheu and Krajewski (2014) noted that when a preventive maintenance practice is established and streamlined, it works well for the entire Tertiary institutions. Furthermore, the hypothesis tested showed that there is no significant difference in the mean rating of lecturers and students on the preventive maintenance practices for instructional technologies in Business Education Departments in tertiary institutions in Ebonyi State

The second findings of the study also revealed that the responses agreed that servicing computer for examination purposes, Servicing typewriters for examination purposes, installing new versions of the operating system in computer, repairing typewriters in preparation for accreditation, repairing computers in preparation for accreditation, repairing typewriters when they locked up and stop functioning, testing damaged machine parts to determine whether major repairs are necessary, repairing photocopying machines when they are broken or stopped functioning, and updating antivirus in a computer are corrective maintenance practices used in maintaining instructional technologies in Business Education Departments in tertiary Institutions, Ebonyi State. The finding is in line with the work of Gordon, Seigha, and Akinleye (2019) who asserted that corrective maintenance practices performed in Business Education Departments in tertiary institutions are: servicing typewriters for examination purposes, repairing typewriters in preparation for accreditation, repairing typewriters when they locked up and stop functioning, repairing photocopying machines when they are broken and stopped functioning, when the internet service providers disconnect internet services in the tertiary institutions due to the Tertiary institutions inability to pay for the subscription charges, when computers are locked up by virus before renewing or updating antivirus, among other. Furthermore, hypothesis tested shows that there is no significant difference in the mean rating of Business Educators and Students on the corrective maintenance in Departments of Business Education in tertiary institutions in Ebonyi State.

7. Recommendations

Based on the findings of the study, the following recommendations are offered

1. Preventive and corrective maintenance should be constantly done on those equipment and facilities by management of Ebonyi State tertiary institutions to prevent damages and complete breakdown of the those facilities and equipment.
2. Management of Ebonyi State tertiary institutions should employ qualified computer laboratory attendant, computer technician, model office attendant to Business Education Department to carry out basic maintenance and repairs on the instructional technologies.
3. Head of Departments should use imprest on at least minor repairs in the Department.
4. Students should be given orientation on how to use such facilities and should be made to either repair or replace any one damaged by them.

8. Conclusion

Based on the findings of the study, it is therefore concluded that assessment of instructional technologies used by Departments of Business Education in tertiary Institutions, Ebonyi State is very important in order to improve the teaching and learning. It is imperative that the maintenance of instructional technologies for teaching and learning be assessed from time to time. The study also shows that employing a professional computer laboratory technician in the Departments of Business Education in tertiary institutions is important.

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