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GREEN MAINTENANCE PRACTICES REQUIRED IN BUSINESS EDUCATION LABORATORIES IN NIGERIAN UNIVERSITIES

[1]Ezemma, J.C[Ph.D],[2]Ugwoke, E.O[Ph.D],[3]Anorue, H.C., [4]Eze, C.C. & [5]Olinya, T.O.

[1-5]Department of Business Education, University of Nigeria, Nsukka.
Corresponding Author E-mail: joseph.ezemma@unn.edu.ng;

Abstract

This study assessed the green maintenance practices required by business educators in Business Education laboratories in Nigerian Universities. Two research questions guided the study. The study adopted descriptive survey design. The population for the study was 35 business educators (lecturers and technical staff) in the Department of Business Education, University of Nigeria, Nsukka. This consists of 20 lecturers and 15 technical staff from the department were used for the study. The instrument used for data collection was structured questionnaire designed by the researchers. The questionnaire was validated by experts while the internal consistency of the questionnaire items was ascertained through Cronbach Alpha technique which yielded a reliability coefficient of 0.90. The questionnaire was administered personally by the researchers. A total of 35 copies of questionnaire were administered, retrieved, analyzed and used for the study. The study found that work chairs and tables, filing/storage cabinets, photocopiers, computer hardware and accessories, PowerPoint projectors, fire proof safe and first aid kit were equipment and facilities that should be in laboratories. It was also found that Business educators were aware of green maintenance practices as the old and new staff were informed, maintenance schedule advising them to keep equipment from obstructions and prevent over-heating by cleaning filters and fans regularly were set up, they were encouraged to save energy with posters and stickers to raise awareness of energy saving in the laboratories and they were communicated to focus on one or two maintenance practices. The researchers recommended that the lecturers and technical staff should carry out green maintenance practices in the laboratories and business educators should regularly create the awareness and let people know the importance of green maintenance practices in Business laboratories.

***Key words**: Green Maintenance Practices, Business Education, Business Education Laboratories.*

Introduction

Green maintenance have become an important issue, which is being developed in the present age to minimize the consumption of energy and help prevent frequent break down and malfunctioning of equipment or facilities as well as accidents in business education laboratories. Greening is an act of improving on the existing system. It is the process of transforming artifacts such as space, a lifestyle or a brand image into a more environmentally friendly version (example greening the home or the office). The act of greening, according to Smith (2018), involves incorporating ‗green' products and processes into one's environment, such as the workplace or general lifestyle. Green products are those products that have less negative impact on the environment or laboratories or less detrimental effect to human health than traditional equivalents. Examples are dryer balls. Dryer balls are basically large rubber balls with spikes covering the surface. The purpose of dryer balls, according to Gould

(2013), is to separate the clothes to facilitate quicker drying and keep them soft. The reusability of the dryer balls renders traditional dryer sheets obsolete and allows one to save money in the process. It is the process of incorporating socially and environmentally responsible decisions into a workplace. It involves sustainable development principles and practices at all levels of activities in the laboratory. It aims to ensure that the laboratory is neat, safe and conserved for sustainability.

Green maintenance practices in business education laboratory should involve all the key role players such as lecturers and technical staff. The terms ‗green maintenance and conservation' and ‗greening' used in this paper refer to responsible decision making and implementation that take note of the laboratory and environmental factors. If the green maintenance practices are really implemented, the anticipated outcomes should be: to improve resource efficiency in the entire work place; to prevent malfunctioning and break down of equipment or facilities to prevent accidents and injuries, and to raise awareness of sustainable issues among all the role players.

Green maintenance is any activity undertaken to conserve as nearly and as long as possible the original condition of an asset which compensate for normal wear and tear. Green maintenance, according to Business Dictionary (2018), is an action necessary for retaining or restoring a piece of equipment and

machine to the specified operable condition to achieve its maximum useful life and guaranteed safety.

The overall principle of green maintenance is to implement sustainable living practices which, according to Kaiser and Gabriel (2009), include preventive and corrective maintenance. Preventive maintenance occurs when equipment and facilities are inspected, maintained and protected before they break down or other problems occur while corrective maintenance occurs where equipment is repaired or replaced after wear, malfunction or break down. Kaiser and Gabriel (2009) stated that testing, measurements, replacements, adjustments and repairs are corrective activities carried out in the laboratories. The authors were of the view that all the activities intended to retain the equipment in serviceable

condition or restore the equipment to serviceability encompass green maintenance. Lentz (2013) stated that green maintenance involves recycling materials collected by the office for waste reduction and recycling programme which include laboratory plastics, glass bottles, cans and paper. This is done by testing plastic bag recycling in a pilot effort with the office of waste reduction and recycling. Fenn (2018) stated that another approach is to check for visible damage and repair the equipment; check the performance and quality of the output to determine if it needs repair or removal; add new oil if there is shortage of oil; remove and replace any damaged part; remove and replace unwanted or obsolete equipment; check the floor for any damaged portion; check for any switch that is having partial contact; check for any wire that may cause damage by touching and inspect roof for damage/or leaking and make arrange for repairs if necessary. The equipment and facilities required green maintenance, according to Utoware & Kren-Ikidi (2013 and Egunjobi (2014) include: work chairs and tables, filing/storage cabinets, photocopiers, wastebasket, computer hardware and accessories, internet connections, PowerPoint projector, fire proof safe and first aid kit. These equipment or facilities are to facilitate teaching and learning process in the laboratory. Green maintenance practices promote participation and education in the laboratories. The availability of green equipment and the green maintenance of the equipment would significantly improve the laboratories by preventing malfunctioning and break down of equipment and facilities through corrective and preventive maintenance, recycling and waste reduction. This will also improve the social development of people which involve fair and beneficial attitudinal practices with regard to labour in which the items and place like laboratories are used (Smith, 2018).

There are many areas where lecturers and technical staff would have positive impact as they operate in laboratories with green practices in view. The areas are in waste minimization and inspection of equipment, water conservation and energy efficiency. One of the major negative laboratory impacts of nongreen maintenance practices is the tremendous amount of waste that is generated. A key element of green maintenance practices, according to Cooley (2018), is to promote awareness and change behaviour on how things are done both in the laboratories and office. The first step is to reduce the amount of waste created (pre-consumption avoidance as well as reduction), followed by effective waste minimization through recycling. It is important to reduce the number of would-be broken down facilities and as well as ensuring that waste that cannot be recovered for recycling be disposed of in the correct manner. Waste management, inspection of equipment and energy efficiency, according to Hodges (2018), are usually very visible activity with great greening potential. It is good to encourage active participation through activities in the laboratories.

Laboratories must follow a certain protocol when it comes to cleaning and maintaining equipment. Business education laboratories have different equipment and requires different cleaning and maintenance supplies and approaches. As they are different they also have different regulations guiding the cleaning and maintenance of the equipment and facilities in each laboratory. What is common is that whatever maintenance approach should positively assist in the achievement of goals in the

laboratories. For instance, in Business Education laboratories glass cleaner is used to remove dust, dirt, oil, finger prints from glass surfaces of computer screens, display cabinets and photocopiers while on other hand one has to check and repair or remove work chairs and tables, filing/storage cabinets when maintaining these equipment in the laboratories (Egunjobi, 2014 and Technical Data Sheet, 2018).

Green maintenance of business education laboratories and offices ensures durability of the equipment, safety uses, and effectiveness of teaching and learning. Greening, according to Smith (2018), aims at strengthening personal conscientiousness on how to conserve equipment and professional competencies contributing to change process in the laboratories. With specific training, greening helps in developing personal skills of business educators in area of self management, innovation management, knowledge management, networking, attitudes and roles. Greening defined by Katherine (2018) is a growing trend in a higher education today which aims at the preparation of professionals and citizens capable of meeting the challenge of converging global environmental problems through increasing levels of environmental literacy. Greening according to 2013 CAP reform refers to farmers who use farm land more sustainably and care for natural resources as part of their everyday work. Greening maintenance practices are therefore essential for the care and safety uses of equipment in Business Education laboratories.

Business education is the aspect of educational process which involves the acquisition of practical skills, attitudes and knowledge required for the production, marketing and use of goods and services. Business education involves knowledge, skills, competencies, structural activities, abilities, capabilities and all other experiences acquired through formal, on the job or off the job training which are capable of enhancing recipients self reliance and employability (Okolocha, 2006). Business education, according to Audu (2014), leads to the acquisition of practical and applied skills that will enable its recipients to secure employment in business occupations. These skills cannot be acquired in a vacuum but rather in a well-established and functional workshop with the right tools, equipment and machines for effectiveness of the programme. Those who acquire the skills through such programme and engage in teaching others are the business educators. By the knowledge acquired, individuals are equipped with the skills that would help them know how to maintain and conserve equipment and facilities in the laboratory. Laboratory is where machines and other items are used (BulGodley, 2012).

All courses in Business Education require high level of practical skills acquisition and need functional laboratories. The laboratories may not be adequately financed or funded but there is need for appropriate maintenance of the available equipment or facilities in the laboratories. Switches should be labeled so that staff and students are aware of switches that are relevant for use and to help staff and students not to be switching on too many appliances or too much lighting in the laboratories. Martin (2013) stated that staff should ensure that vending machines carrying non-perishable items can be set on a timer or switched off during off work hours or on weekends when the building or laboratory is closed. Staff also are required to set the power controls to either shut down or safely shut down at a

particular time for servers and software that monitor all computers on the network. Martin further stated that staff should periodically inform students about the possibilities of saving energy by pasting stickers and posters at strategic places. The author opined that staff should equip power control rooms with key locks in order to further reduce the energy loss by standby mode and power voltage system should be installed on the roof. Siegle (2009) advised that staff should turn out lights in rooms or parts of the house where no one is and teach others about it. Siegle stated that upgrading lighting systems with efficient light sources, fixtures and controls can reduce lighting energy use. Wang (2018) opined that commitment to environmental or laboratory practices include recycling and reuse, energy efficiency and conservation, lighting, water efficiency and conservation. Ramirez-Aguilar (2013) stated that staff should place plastic containers in copier rooms to collect waste papers in order to separate clean waste paper for recycling. The author was of the opinion that digital media and both-sided copying using the downsizing option should be used to help to cut paper consumption. Kaiser and Gabriel (2009) opined that lecturers should regularly inspect equipment and facilities in the laboratories to ensure that the equipment and facilities are in good condition. The technical staff on the other hand should maintain the equipment and facilities to avoid break down of the equipment.

Lecturers and technical staff should create awareness in the work environment on how equipment and facilities are to be maintained. Bucki (2018) stated that lecturers and technical staff should set up maintenance schedule on how to keep equipment free from obstructions and prevent overheating by cleaning filters and fans regularly. Staff should be encouraged to create awareness on how to save energy in business laboratories by pasting stickers on the entrance to the laboratories and walls. Bucki advised that the staff should ensure that both new and old staff are informed about green maintenance practices. Junuila and Hovarth (2003) stated that the unconcerned attitude of lecturers and technical staff in creating awareness on how to maintain the equipment and facilities in the business education laboratories is unfortunate. Junuila and Hovarth suggested that people should be exposed to the importance of maintaining facilities in the laboratory so that the available equipment in the business education laboratories should be well preserved. Hodges (2005) stated that the awareness of the important of facilities maintenance practices should be regularly propagated or communicated to people to know the effective maintenance of the facilities in the laboratories. Facilities in TVET institutions, according to Umar and Ma-aji (2010), are very poor. Umar and Ma-aji stated that there is no planned measure of maintenance for the available and broken down equipment. The authors were worried that there is no concern on the part of lecturers and technical staff for the non-planned measures for green maintenance. Green maintenance and conservation practices help to protect equipment and facilities from breaking down. There would be malfunction and break down of equipment and facilities anywhere green maintenance is neglected. Uzoagulu (1993) opined that where equipment and tools are not functional or adequately maintained, that technical training programmes should suffer and would lead to production of unskilled graduates who would be unproductive and unemployable. Audu (2014) stated that the facilities originally designed and built for small populations are now used by larger populations. Audu suggested that the facilities should be regularly maintained for effectiveness and efficiency of performance. Poor maintenance of the stressed facilities would lead

to malfunctioning and break down of the equipment which could lead to poor performance of students in business education programmes. This implies that many would not graduate and even those who would graduate should graduate without required skills needed by the labour market. Therefore, the major purpose of this paper is to assess the green maintenance practices required by Business educators in business education laboratories. Specifically the paper sought to:

1. Identify equipment and facilities that required green maintenance in business education laboratories.
2. Ascertain the business education educators' current awareness of the green maintenance practices required in business education laboratories.

Research questions

The paper answered the following research questions:

1. What are the equipment and facilities that require green maintenance in business education laboratories?
2. What are business educators' current awareness of the maintenance practices required in business education laboratories?

Methodology

The study adopted descriptive survey design to identify equipment and facilities that require green maintenance in business education laboratories and ascertain business education educators current awareness of the green maintenance practices required in the laboratories. The study was conducted in University of Nigeria, Nsukka and in the Department of Business Education. Department of Business Education was chosen because there are many equipment and facilities used in the business education laboratories that require green maintenance.

The population for the study was 35 business educators in the Department of Business Education, University of Nigeria, Nsukka. This consists of 20 lecturers and 15 technical staff of the Department. The instrument used for data collection for the study was a structured questionnaire titled _Green Maintenance Practices Required by Business Educators in Business Education Laboratories in Nigerian Universities (GMPRBEBELNU'). The instrument was developed by the researchers based on literature reviewed. The instrument was divided into Part I and Part II. Part I is on general information about the respondents. Part II was further divided into sections A and B. Section A has 9 items that sought information on the equipment and facilities that required green maintenance in business education laboratories. Section B has 10 items statement that sought information on the business educators' current awareness of the maintenance practices that required in the laboratories. The response categories for the two sections was a 4-point rating scale which ranges from 4 – 1 (Strongly agree = 4; Agree = 3; Disagree = 2; strongly disagree = 1).

The questionnaire was validated by three experts from the Department of Business Education. The Cronbach Alpha reliability test was used to determine the internal consistency of the items and a reliability coefficient of 0.90 was obtained. The questionnaire was administered directly to the respondents by the researchers. The researchers took time to explain to the respondents areas and terms they find difficult to understand to ensure their objective responses to the questionnaire items. Thirty-five copies of the questionnaire were administered and all the copies were retrieved showing 100% return rate. The data collected were analyzed using Statistical Package for Social Science (SPSS) while mean and standard deviation were used to answer the two research questions. Mean scores of 2.50 and above were regarded as agreed while mean scores below 2.50 were regarded as disagreed.

Table 1: Mean responses of respondents on equipment and facilities that required green maintenance in Business Education laboratories.

S/	Equipment/facilities and	Lecturers		Technical Staff		Overall	
no	Maintenance activities	X	SD	X	SD	X	SD
1	Work chairs/tables – check visible damage and repair or replace.	2.8	.96	3.0	.93	2.9	.95
2	Filing/storage cabinets – inspect to check for any damage and repair or replace.	3.5	.62	3.2	.70	3.4	.66
3	Photocopier – check the performance and quality of output to determine if to repair or refill ink.	3.1	.59	3.3	.59	3.2	.59
4	Wastebasket – check and remove litter paper into it.	3.4	.58	3.1	.65	3.3	.62
5	Computer hardware and accessories-check for and repair any faulty part or remove spoilt parts.	3.0	.74	3.4	.81	3.2	.78
6	Internet connections – check and repair any faulty part or replace any spoilt part.	3.2	.59	3.1	.60	3.2	.60
7	PowerPoint Projector – check and repair or replace any damage part.	3.1	.60	3.2	.58	3.2	.59
8	Fire proof safe – inspect for expiration date and replace if expired.	3.0	.61	3.3	.59	3.2	.60
9	First aid kit – Wash it often and replace when it is old.	3.2	.60	3.3	.59	3.3	.60
	Grand mean and standard deviation					3.2	.66

In table 1 the grand mean score was 3.2 and this laboratories. The grand standard deviation of items implied that the respondents agreed that the nine 1 – 9 was .66 and it implies that the range in the item statements were equipment and facilities that responses of respondents was not far from the mean.

required green maintenance in business education

Table 2: Mean responses of respondents on the Business educators' current awareness of the importance of maintenance practices in laboratories.

S/no	Item statement	Lecturers X	SD	Technical Staff X	SD	Overall X	SD
1	Ensure that both new and old staff are informed about green maintenance practices.	3.6	.58	2.9	.66	3.3	.62
2	Communicate a set up maintenance schedule advising staff to keep equipment free from obstructions and prevent over-heating by cleaning filters and fans regularly.	3.6	.57	2.9	.66	3.3	.62
3	Encourage staff to save energy with posters and stickers to raise awareness of energy saving and other green maintenance culture in model office and business education laboratories.	2.9	.59	3.7	.49	3.3	.54
4	Post stickers on the entrance and walls of business education laboratories and model office to help create awareness on how to be involved in green maintenance practices.	3.6	.57	2.8	.69	3.2	.63

5	Communication should concentrate on one or two maintenance practices at a time and the style should be changed regularly to maintain interest.	2.8	.71	3.6	.50	3.2	.61
6	To maintain interest, one should continue to communicate messages at longer intervals and adjust the messages according to what is or is not working.	3.5	.49	2.9	.68	3.2	.59
7	Maintain displays and posters on green maintenance culture and refresh them at regular intervals.	2.9	.59	3.2	.70	3.1	.65
8	Place the displays where everybody can see them, including visitors.	3.4	.60	2.8	.69	3.1	.65
9	Use compelling images such as photos and cartoons.	3.5	.51	3.0	.61	3.3	.56
10	Use durable materials. Laminating display materials ensures their quality and longevity	3.7	.50	3.1	.60	3.4	.55
	Grand mean and standard deviation					3.6	.67

The grand mean score of all the items in table 2 was 3.6 and was within the boundary limit of 2.50 – 4.00. This implied that the item statements showed that the business educators were aware of the green maintenance practices required in business education laboratories. The grand standard deviation of items 1 – 10 in table 2 was .67. This implies that the opinions of respondents were close to each other.

Discussion of Findings

The findings showed that work chairs and tables, filing/storage cabinets, photocopiers, wastebasket, computer hardware and accessories, internet connections, PowerPoint, fire proof safe and first aid kit were equipment and facilities that required green maintenance which should be in business education laboratories. This finding is in line with the study conducted by Utoware & Kren-Ikidi (2013) which listed work chairs and tables, filing/storage cabinets, photocopiers, wastebasket, computer hardware and accessories, internet connections, PowerPoint projector as equipment and facilities in business education laboratories. Egunjobi (2014) also listed fire proof safe and first aid kit as equipment and facilities that should be in business education laboratories. These equipment or facilities are to facilitate teaching and learning process in the laboratory.

The findings of the study showed that business educators were aware of green maintenance practices in business education laboratories. This was made known to them through a set up maintenance schedule pasted on entrance of the laboratories and walls. This finding is in agreement with Bucki (2018) statement. The author stated that staff should be encouraged to create awareness on how to save energy in business laboratories by pasting stickers on the entrance to the laboratories and walls. The finding is also in agreement with Martin (2013) who stated that staff should periodically inform students about the possibilities of saving energy by pasting stickers and posters at strategic places. The finding agreed with the key element of green maintenance practices according to Cooley (2018) which promote awareness and change behavour on how things should be done in both laboratories and office. The steps include preconsumption avoidance as well as reduction and effective waste

minimization through recycling. The study is also in agreement with Hodges view which stated that waste management, inspection of equipment and energy efficiency approaches were activities made known to business educators.

Conclusion

Based on the findings and the discussion of the study, the following conclusions were made. The study revealed that work chairs and tables, filing/storage cabinets, photocopiers, wastebasket, computer hardware and accessories, internet connections, PowerPoint projector were equipment and facilities available in business education laboratories. The study also revealed that fire proof safe and first aid kit were equipment and facilities that should be in business education laboratories.

The study also revealed that business educators were aware of green maintenance practices in business education laboratories as evidenced by a set up maintenance schedule for green maintenance practices placed on both entrance and walls of business education laboratories using compelling images such as photos and cartoons. The study revealed that staff having been aware made them to encourage students to save energy by pasting stickers and posters at strategic places. The study also revealed that waste management, inspection of equipment and energy efficiency approaches were activities made known to business educators.

Recommendation

Based on the findings and conclusions the following recommendations were made:

1. Lecturers and technical staff should practice the green maintenance in business education laboratories.
2. Lecturers and technical staff should createawareness on green maintenance practices required in business education laboratories.
3. Business Education lecturers being aware of the green maintenance practices required in the laboratories should regularly apply the green maintenance practices and also teach the students the practices.

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