SKILLS NEEDED BY BUSINESS EDUCATORS FOR PREDICTIVE MAINTENANCE OF OFFICE MACHINES IN PUBLIC COLLEGES OF EDUCATION IN ANAMBRA STATE

Ile, C.M
cm.ile@unizik.edu.ng
Department Of Business Education
Faculty of Technology and Vocational Education
Nnamdi Azikiwe University, Awka
&
Onwu, Chinelo. J
jc.onwu@unizik.edu.ng
Department Of Business Education
Faculty of Technology and Vocational Education
Nnamdi Azikiwe University, Awka

Abstract
The study determined the skill needs of business educators for predictive maintenance of office machines in public colleges of education in Anambra State. One research question guided the study, and one null hypothesis was tested. A descriptive survey research design was adopted. The population of the study consisted of 83 business educators in two public colleges of education in Anambra State. The entire population was studied without sampling because the population was manageable. A structured questionnaire, which was validated by three experts, was used for data collection. Cronbach alpha was used to measure the internal consistency, which yielded an overall reliability coefficient of 0.72. The researcher administered 83 copies of the instrument with the help of four research assistants using the direct method on the respondents. Mean and standard deviation were used to answer the research questions, while the t-test was used to test the null hypothesis at a 0.05 level of significance. The outcome of the study disclosed that skills for predictive maintenance of office machines were highly needed by business educators in public colleges of education in Anambra State. Also, business educators did not differ significantly in their mean ratings on skills needed for predictive maintenance of office machines in public colleges of education in Anambra State based on institutional ownership. The study concluded that skills improvement for predictive maintenance of office machines were highly needed by business educators in colleges of education in Anambra State because they appear not to have the technical background to promptly identify machines that were not in good working conditions. Among others, it was recommended that business educators in colleges of education in Anambra State should undergo professional training and development programmes on predictive maintenance with servicing and maintenance companies to enable them quickly to detect, analyze, and handle issues affecting the usability of office machines before they break down.

Keywords: Business education, business educators, office machines, predictive maintenance.

Introduction

The College of Education is one of the higher educational institutions in Nigeria that is specially designed for preparing students for the teaching profession. The existence of colleges of education in Nigeria has contributed immensely to national development, particularly in the development of middle-level manpower for the nation's primary and junior secondary schools. Comprehensively, Onokpaunu (2023) posited that colleges of education are teacher training institutions that provide full-time and remedial courses in instructional methodologies, learning styles, school management, behavioural and sociological dispositions of children, adolescents, and adults, philosophical and theoretical underpinning of subject matters, as well as curriculum development of programmes across all areas of learning. One of the specialized courses offered in Nigerian colleges of education is business education

Business education is generally recognized as education for and about business because it not only provides general awareness of the business world but also prepares students for professional careers in the world of work. Azih and Igboke (2017) averred that business education is a segment of vocational education programme that prepares learners for optimum professional performance in corporate offices, teaching of business subjects in institutions of learning or starting and managing business enterprises. According to Ile and Edokpolor (2022), business education is a planned and organized programme of learning that equips business-oriented students with lifelong skills and knowledge to perform numerous professional tasks of the workplace upon graduation. In this study, business education is an educational programme that is embedded with workplace skills and practices capable of instilling instructional acumen and entrepreneurial culture among students in colleges of education.

The implementation of business education programme in colleges of education is the professional responsibility of business educators. According to Oluwasina, Onokpaunu and Durojaye (2018), business educators are operators of business education curriculum who prepare business education students for the world of work. Okon and Chukwurah (2020) submitted that business educators are professional instructors who can select appropriate instructional methods for teaching business education courses and their allied courses in universities, colleges of education, and polytechnics. In the context of this study, business educators are educators who are tasked with the responsibility of equipping students for self and paid jobs on graduation from colleges of education. One of the instructional avenues through which business educators can prepare students for the world of work is the use of office machines in their teaching and learning process in colleges of education.

Office machines are simple and sophisticated equipment, devices, and technologies used for facilitating smooth operations of the office. Office machines are usually used as instructional resources by business educators to prepare students for the dynamics of the 21st century office. Armah (2015) averred that office machines include typewriters, duplicators, perforators, intercoms, file trays, filing cabinets and drawers, calculators, copying machines, franking and tabulating machines, billing machines, payroll machines, addressing and mailing machines as well as punched card machines among others. In addition, Oteng and Seidu (2016) posited that office machines include Apple iPhones, personal computers, scanners, printers, photocopiers, electronic mail, 3d image video conferencing, desktop publishing system and robotics, among others. Aligning with this narrative, Onoja (2020) averred that office machines are modern technologies such as personal computers, word processors and other technologies used to upgrade workers' productivity and efficiency in the office.

One can infer that office machines enhance office managers' work performance and workers' productivity, because their availability makes the workplace less boring. Since,

office machines and their components are expensive and fragile, it is critical to ensure their usability as instructional resources by business educators in colleges of education. This gives credence to the importance of maintenance. Maintenance is the practice of keeping office machines in a reliable condition by regularly checking their operational status in order to ensure that they continue to function as designed. Mahajan, Adatiya, Badhe, Patsute, and Bhusnar (2018) posited that maintenance is the deliberate effort made to ensure that equipment and machines are working reliably and effectively. The essence of office machine maintenance in colleges of education is to prevent excessive machine breakdown, frequent emergency maintenance works, and shortened life-span of available office machines by business educators and students for teaching and learning. In the context of this study, maintenance refers to all the activities performed by business educators in order to retain the satisfactory working condition of office machines or their parts so that they can be used for instructional engagements whenever the situation arises. Ado and Hudu (2018) described maintenance as all technical, administrative and managerial actions taken during the life cycle of an asset(s) to ensure that the assets continue to perform their intended functions, or to keep them running by restoring them to their required or favourable operating conditions. Despite the different types of maintenance that are commonly encountered both in practice and in academia, Fakomogbon (2014) and Shafiee (2015) submitted that the major types of maintenance in business organizations and workshops are preventive, predictive, corrective and total productive maintenance. With this in mind, the study focused on predictive maintenance.

The rationale behind this decision is that predictive maintenance is carried out immediately trouble shooting signals are observed in any of the parts of office machines. Predictive maintenance refers to any maintenance activity undertaken when a small deviation from the normal working conditions of a system is noticed (Iorliam, 2015). Ohanu, Ogbonnia and Shodipe (2020) averred that predictive maintenance involves identifying and repairing faulty machine parts before it leads to major breakdowns of machines that will demand corrective maintenance. The common premise of predictive maintenance is anchored around regular monitoring of the actual mechanical and electrical conditions, working efficiency and other indicators of the operating conditions of office machines (Igwe, Utebor, and Olannye, 2021). Hence, Anagbogu (2018) submitted that the maintenance skills gained from training with old and outdated machines are no longer enough for business educators to keep sophisticated office machines in good working conditions. According to Ado and Hudu (2018), predictive maintenance skills cut across the ability to interpret displayed messages arising from system failure of equipment, detection of machine overload, recognizing signs of breakdown of machines and identifying parts of equipment that require system update, among others. However, Ubaka (2022) argued that business educators will not be able to carry out predictive maintenance without possessing the necessary maintenance skills.

Skill is the ability or competency to do something excellently. Professionally, a skill is an established habit of performing a task in a way that is acceptable within the confines of an organization. Paul, Uduonyi, and Ini-Uwem (2016) defined skill as a talent that comes from training or practice. In this study, skills refer to the ability of business educators to ensure the functionality of office machines before, during, and after instructional delivery in colleges of education. However, the reported cases of unavailability of functional office machines in model offices of colleges of education in Anambra State (Ubaka, 2022), question the maintenance skill needs of business educators. Skill needs are upgrades in skills demanded by occupational requirements as a result of innovation. The various technological innovations in the electronic industry are expected to cause changes in the maintenance practices of office machines.

The rating of skill needs of business educators for predictive maintenance of office machines could be influenced by their institutional ownership. Institutional ownership refers to educational institutions under the control of federal and state governments, as well as private individuals. In the context of this study, institutional ownership is limited to colleges of education that are established and controlled by the federal and state governments. Igboke and Onwuachu (2022) submitted that instructional technologies are provided more in quality and quantity in colleges of education owned by federal government than state-owned colleges of education in Nigeria. Hence, the researchers argued that business educators in federal colleges of education may be in a better position to know areas where they need skills for predictive maintenance of office machines than their counterparts in State colleges of education. Again, this assumption needs to be supported by empirical investigation.

When business educators are equipped with predictive maintenance skills, they will become reliable in maximizing the lifespan of office machines in colleges of education. From the researcher's personal observation in the Departments of Business Education in public colleges of education in Anambra State, there are worn-out printers, scanners, overhead projectors, and faulty photocopying machines in the model offices. The abandoned office machines and their parts in public colleges of education in Anambra State raise doubts about the predictive maintenance skills of business educators. This justifies the identification of the skill needs of business educators for predictive maintenance of office machines in public colleges of education in Anambra State.

Statement of the Problem

An investigative visitation of most public (state and federal-owned) colleges of education in Anambra State by the researchers revealed that most of the available office machines were not readily used for teaching and learning, and students were not properly exposed to the practical operations of office machines and their parts in the classroom. It was a common sight to see idle office machines in model offices and business education laboratories in public colleges of education in Anambra State. This unpleasant reality questions the skill sets of business educators for the maintenance of office machines in public colleges of education. The problem of the study is that business education students will graduate from public colleges of education without knowing how to operate and maintain simple and sophisticated office machines. With this, there is an urgent need for business educators to acquire the requisite maintenance skills for ensuring the usability and functionality of the few available office machines for instructional purposes. Hence, this study identified skill needs of business educators for predictive maintenance of office machines in public colleges of education in Anambra State.

Purpose of the Study

Specifically, the study determined the skill needs of business educators for predictive maintenance of office machines in public colleges of education in Anambra State.

Research Question

The following research question guided the study:

1. What is the skill needs of business educators for predictive maintenance of office machines in public colleges of education in Anambra State?

Hypothesis

The following null hypothesis was tested at a 0.05 level of significance:

1. There is no significant difference in the mean ratings of business educators on the skill needs for predictive maintenance of office machines in public colleges of education in Anambra State based on institutional ownership.

Method

A descriptive survey research design was employed for the study. A descriptive survey research design made it possible for the researchers to collect the opinions of business educators on skill needs for predictive maintenance of office machines using a questionnaire. The population for the study consisted of 83 business educators in the two public colleges of education in Anambra. The entire population was studied without sampling because the population was manageable.

A structured and validated questionnaire containing 10 items on a five-point rating scale of Very Highly Needed (VHN), Highly Needed (HN), Moderately Needed (MN), Slightly Needed (SN), and Not Needed (NN) was used for data collection. The reliability of the instrument was determined through a trial test. Copies of the instrument were administered to 10 business educators in public colleges of education in Ebonyi State who were not part of the research population. Cronbach alpha was used to measure the internal consistency, which yielded a reliability coefficient of 0.72. The researchers, together with four research assistants, used a direct delivery method to administer copies of the questionnaire to the respondents in their offices. The distribution and collection of copies of the questionnaire lasted for two weeks. Out of the 83 copies of the questionnaire administered, 72 copies (representing 91 percent) were successfully retrieved and used for data analysis.

Mean and standard deviation were used to answer the research questions and determine the homogeneity or otherwise of the respondents' views. Decisions on the research questions were based on the grand mean in relation to the real limits of numbers. Therefore, items with mean ratings of 1.00 - 1.49 were rated Not Needed, those with 1.50 - 2.49 were Slightly Needed, items with mean ratings of 2.50 - 3.49 were rated Moderately Needed, those with 3.50 - 4.49 were rated Highly Needed, and items with mean ratings of 4.50 - 5.00 were rated Very Highly Needed. Inferential statistics of the t-test were used to test the null hypothesis at 0.05 level of significance. A hypothesis was accepted where the p-value was greater than the alpha level of 0.05 ($p > 0.05$), at an appropriate degree of freedom; otherwise, the null hypothesis was rejected.

Results

Research Question 1

What are the skills needed of business educators for predictive maintenance of office machines in public colleges of education in Anambra State?

Table 1

Respondents' mean ratings on skill needs for predictive maintenance of office machines

S/N	Predictive maintenance skill needs	$\overline{X}$	SD	Remarks
1	Ability to forecast the reliability of parts of office machines	4.90	.77	Very Highly Needed
2	Ability to track the operational conditions of the office machines to avoid electrical overloads	4.68	.93	Very Highly Needed
3	Ability to locate the causes of repeated failure of office machines	3.71	.84	Highly Needed
4	Ability to interpret the displayed messages arising from system failure of office machines	3.94	.66	Highly Needed

5	Ability to detect why office machines are being overloaded	4.02	.90	Highly Needed
6	Ability to recognize signs of breakdown of office machines	3.85	.72	Highly Needed
7	Ability to isolate problems arising from failures of office machines	3.91	.61	Highly Needed
8	Ability to create bootlog to identify sources of failure of office machines	4.16	.89	Highly Needed
9	Ability to detect the presence of contaminants that affect The normal operation of office machines	4.63	.78	Very Highly Needed
10	Ability to identify parts of office machines that require system update	3.97	.92	Highly Needed
	Cluster Mean	**4.18**	**.80**	**Highly Needed**

Data in Table 1 show that three items on predictive skills are very highly needed for the maintenance of office machines by respondents with mean ratings ranging from 4.63 to 4.90 and standard deviations of 0.77 to 0.93. The remaining seven items with mean ratings ranging from 3.71 to 4.16 and standard deviations ranging from 0.61 to 0.92 are rated highly needed. The cluster mean of 4.18 indicates that skill needs for predictive maintenance of office machines are highly needed by business educators in public colleges of education in Anambra State. The standard deviations for the items show that the respondents are homogeneous in their opinions.

Hypothesis 1

There is no significant difference in the mean ratings of business educators on the skills needs for predictive maintenance of office machines in public colleges of education in Anambra State based on institutional ownership

Table 2

Summary of t-test analysis of respondents' mean ratings on skill needs for predictive maintenance of office machines based on institutional ownership

Variable	N	$\bar{x}$	SD	df	t-value	p-value	Decision
State COEs	59	75.01	6.38	104	0.263	0.497	Not Significant
Federal COEs	47	83.60	7.54				

Table 2 shows that there is no significant difference in the mean ratings of business educators in federal and state colleges of education on skill needs for predictive maintenance of office machines in colleges of education in Anambra State. This is shown by the p-value of 0.497, which is greater than the significance level of 0.05. The null hypothesis of no significant difference between the two groups is therefore accepted.

Discussion of findings

The outcome of the study disclosed that skill needs for predictive maintenance of office machines are highly needed by business educators in public colleges of education in Anambra State. The study reported that predictive maintenance skills are highly needed business educators in public colleges of education in Anambra State to locate the causes of repeated failure of office machines, to interpret displayed messages arising from system failure of office machines, to detect why office machines are being overloaded, to recognize signs of breakdown of office machines, to isolate problems arising from failures of office machines, to create boot log to identify sources of failure of office machines and identify parts of office machines that require system update. This finding corresponds with the study

of Iorliam (2015), who reported that educators highly need predictive skills for the maintenance of office machines and technologies in tertiary institutions.

The finding that predictive skills are very highly needed for the maintenance of office machines by business educators in colleges of education in Anambra State to forecast on the reliability of components parts of office machines, to track the operational conditions of office machines to avoid electrical overloads and detect the presence of contaminants that affect the normal operation of office machines agree with Ado and Hudu (2018) who reported that educators needed diagnostic skills to specifically carry out predictive maintenance on the malfunctioning components or parts of machines. The fact that skills needed for predictive maintenance of office machines are highly needed by business educators in public colleges of education in Anambra State means that these business educators need to acquire predictive maintenance skills that will enable them to monitor the operational conditions of office machines to determine their fitness for continued use or not before the machines start crying for help.

The study equally discovered that business educators did not differ significantly in their mean ratings on skill needs for predictive maintenance of office machines in public colleges of education in Anambra State based on their institutional ownership. This finding supports the findings of Ado (2014), who reported that educators, irrespective of their institutional ownership, highly need predictive maintenance skills to enable them predict the chances of available machines developing faults necessitating timely repairs. This finding means that the ownership of colleges of education of business educators had no statistically significant difference in their mean ratings on predictive skills needed for the maintenance of office machines.

Conclusion

Office machines are vital in business education programme because they help to facilitate school to workplace transition of students. The usability of office machines for instructional delivery in colleges of education depends on the maintenance culture of business educators. Based on the findings of the study, it is concluded that skills improvement is needed for predictive maintenance of office machines are highly needed by business educators in colleges of education because they appear not to have the technical background to promptly identify machines that are not in good working conditions.

Recommendations

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

1. Heads of business education departments in colleges of education should organize training courses and seminars at regular intervals to update the predictive maintenance skills of business educators. This would enable them become more proficient in detecting operational issues of office machines in colleges of education.
2. Business educators in colleges of education should undergo professional training and development programmes on predictive maintenance with servicing and maintenance companies to enable them quickly detect, analyze, and handle issues affecting the usability of office machines before they break down.
3. Manufacturing, servicing, and maintenance companies should, from time to time, visit business education departments in colleges of education to enlighten business educators on the novel predictive maintenance skills used for the maintenance of modern office machines in the offices, departmental laboratories, and classrooms.

References

Ado, Y.K. (2014). *Skill improvement needs of electrical teachers for the maintenance of electrical laboratory equipment in technical colleges in Kano State*. Unpublished masters' thesis, Department of Vocational Teacher Education, University of Nigeria, Nsukka.

Ado, Y.K., & Hudu, I.M. (2018). Skill improvement needs of electrical teachers for the maintenance of electrical laboratory equipment in technical colleges in Kano State. *International Journal of Advanced Academic Research, Sciences, Technology & Engineering*, 4(7), 57 – 99

Anagbogu, I. (2018). *Business educators' rating of strategies for equipment maintenance and security for effective teaching in tertiary institutions in Anambra State*. Unpublished masters' thesis, Department of Vocational and Technical Education, Nnamdi Azikiwe University, Awka.

Armah, E.D.A. (2015). The impact of office information and communication technology on the performance of the professional secretary at the Ghana Ports and Harbours Authority, Takoradi. *International Journal in Management and Social Science, 3*(1), 365-373

Azih, N., & Igboke, S.A. (2017). The place of computer based technology in the curriculum of colleges of education in Nigeria. *International Journal of Research in Social Sciences,* 15(1), 20 – 25

Fakomogbon, B.N. (2014). Basic maintenance strategies of technology education teachers. *Journal of Technical Education Today,* 7(1&2), 9-26.

Igboke S.A., & Onwuachu, R.N. (2022). Preventive and corrective maintenance practices on instructional technologies adopted for effective instructional delivery by business education departments in colleges of education in Nigeria. *Noble International Journal of Social Sciences Research, 7*(1),33-39

Igwe, K.O., Utebor, J.N., & Olannye, V.E (2021). Extent of availability and maintenance practice of office technologies in government parastatals In Ebonyi State, Nigeria. *International Journal of Innovative Information Systems & Technology Research, 9*(3),149-160

Ile, C.M., & Edokpolor, J.E. (2022). Work self-efficacy and job performance of business educators in public universities. *InSight: Jurnal Ilimial Psiklogi, 24*(1), 1-13.

Iorliam, J.N. (2015). *Skills required for computer maintenance by lecturers in colleges of education in Benue State*. Unpublished masters' thesis, Department of Computer Education, University of Nigeria, Nsukka

Mahajan, U.K., Adatiya, P., Badhe, P., Patsute, A., & Bhusnar, A. (2018). Total productive maintenance to improve overall equipment effectiveness. *Global Journal of Research in Engineering*, *18*(3), 16 - 56

Ohanu, I.B., Ogbonnia, O.K., & Shodipe, T.O. (2020). Maintenance practices required by electrical installation and maintenance work personnel for repairing industrial motors in Enugu State. *Vocational and Technical Education Journal, 2*(1), 164 – 172

Okon, E.E., & Chukwurah, C.C. (2020). Technology-driven teaching skills' need of business education lecturers and content delivery in a globalised economy. *Journal of Education and Learning (EduLearn), 14*(3), 393 - 401

Oluwasina, B.R., Onokpaunu, M.O., & Durojaye M.O. (2018). Business educators' appraisal of colleges of education business education curriculum content for entrepreneurial success in Niger Delta Region of Nigeria. *NAU Journal of Technology and Vocational Education, 3*(1), 172 – 191

Onoja, B.L. (2020). Office automation and secretarial productivity in Rivers State university. *American International Journal of Nursing Education and Practice, 1*(1), 22-34.

Onokpaunu, M.O. (2023). *Needs assessment of the implementation of accounting education curriculum in federal colleges of education in South-South, Nigeria*. Unpublished Doctoral Dissertation, Department of Technology and Vocational Education, Nnamdi Azikiwe University, Awka, Anambra State

Oteng, P.A., & Seidu, P.A. (2016). The impact of modern office technology on the secretary's performance in some selected business organizations in the Takoradi Metropolis. *ADRRI Journal of Arts and Social Sciences, 12*(2), 1-9

Paul, A. E., Uduonyi, O.E., & Ini-Uwem, E.U. (2016). ICT and accounting skills required for the establishment of small scale enterprises by business education students in college of education, Afaha Nsit, Akwa Ibom State. *International Journal of Educational Benchmark, 5*(1), 57 – 71

Ubaka, R.N. (2022). 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. *The Nigerian Journal Research and Production, 25*(1), 1 - 10