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Skills Acquisition in Artificial Intelligence in Correlation to Office Technology and Management (OTM) Educators' Instructional Effectiveness in Public Polytechnics in North-East, Nigeria

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Abstract- ***The study examined skills acquisition in Artificial Intelligence in correlation with Office Technology and Management (OTM) educators' instructional effectiveness in public polytechnics in North-East, Nigeria. It was guided by two research questions and two hypotheses. Correlational research design was adopted in the study. The population of study comprised 64 OTM educators in ten public polytechnics in North-East, Nigeria. The entire population was used due to its manageable size, hence, there was no sample. Two research instruments entitled: Artificial Intelligence Skills Acquisition Test (AISAT) and Instructional Effectiveness Rating Scale (IERS) were used for data collection. Both instruments were validated by experts and tested for reliability using K-R 20 for AISAT and Cronbach Alpha Coefficient for IERS. The result obtained for AISAT was 0.79, while IERS had reliability coefficient of 0.86. These results indicate that the instruments are suitable for use in the study. Data collected were analysed using Pearson Product Moment Correlation Coefficient (r) to answer the research questions, while the null hypotheses were tested using regression. Findings revealed that there is a high positive relationship between the variables. Furthermore, the relationship between AI-powered writing assistance skills and OTM educators' instructional effectiveness is statistically significant. Also, the relationship between online learning management skills and OTM educators' instructional effectiveness in public polytechnics in North-East, Nigeria is statistically significant. The study recommended that there should be training sessions and workshops to enhance OTM educators' proficiency in AI to enable them function effectively in the use of AI for instructional purposes.***

I. INTRODUCTION

Instructional effectiveness refers to the ability of the teacher to utilize his pedagogical competencies to achieve positive learning outcomes. It is a measure of how well a teacher helps students to learn and retain information. Instructional effectiveness can be considered as the broad range of knowledge, preparation, skills, and attitudes that result in effective teaching and students' learning (Californian State University, 2024). In the assertion of Okolocha and Chibuzor (2018), instructional effectiveness involves an understanding of the subject or concept, the ability to differentiate learning opportunities, incorporate pedagogical practices and check for understanding. Ko et al. (2013) maintained that instructional effectiveness centres on good teaching, possessing appropriate and sufficient knowledge of the subject matter, evaluating the students, identifying their appropriate learning needs and requirements, possessing skills regarding the usage of questions to engage and challenge the students. Instructional effectiveness as used in the study relates to the ability of Office Technology Management (OTM) educators to manage their behaviours and relating well with students, maintain effective classroom control and utilize appropriate instructional technologies to improve students' performance.

The importance of instructional effectiveness cannot be overemphasized. Ubulom et al (2021) noted that it makes learning objectives clearer and specific for easy comprehension, and it also encourage students' participation. Instructional effectiveness do not only arouse students' interest and encourage their participation, it helps students to achieve educational goals and objectives (Owoh, 2016). Instructional effectiveness can lead to meaningful and measurable learning outcomes, promotes students understanding and retention of information, and enhances critical thinking and problem-solving skills. Effective instruction can help students retain information and apply it in real-world situations. It can enhance student

engagement and motivation which can lead to improved students' understanding and performance.

One factor that can influence instructional effectiveness is technology. An aspect of technology that can help OTM educators improve in instructional delivery is Artificial Intelligence (AI). AI is defined as an interdisciplinary field of science covering machine learning, natural language processing, computer vision, robotics, and expert systems working together to achieve human-like intelligent behaviour. Akgun and Greenhow (2022) considered AI as the combination of applications of machine learning, deep learning, algorithm production, and natural language processing. AI has become an integral part of education system in the 21st century; contributing greatly to flexibility and convenience, which enables learners to learn at their time and space (Kabudi et al., 2021; Tahiru, 2021). AI is also found to enhance accessibility to education by providing learners with access to quality educational resources from any location (Baidoo-Anu and Ansah, 2023). Despite these benefits, the use of AI for instructional delivery in most part of the world including North-East, Nigeria is faced with some challenges, especially, since it is newly adopted in the school system for teaching and learning. This could explain why most OTM educators seem not capable in using AI for effective instructional delivery. As a matter of fact, they cannot teach with tools which they are not conversant with. It is therefore, suggested that OTM educators most first acquire relevant AI skills to enable them use AI tools in teaching.

Skills acquisition refers to the process of gaining knowledge, abilities, and competencies that are essential for success in various areas of life including teaching. These skills can be acquired through formal education, training programmes, on-the-job experience, or self-directed learning. Ikegwu et al (2014) conceived skills acquisition as the ability to learn a skill, which can be intellectual such as learning to listen, speak, read and write or manual such as learning to build or make something. According to Oyebanji et al. (2024), to acquire a skill is to demonstrate the habit of acting, thinking and behaving until a process becomes natural to the individual through reverberation or practice. This suggests that skills acquisition progresses through stages, from been novice to expert due to practice and experiences gained overtime.

Skills acquisition is crucial for personal and professional growth. As Scholars International Institute of Technology (2024) noted, individuals who are well equipped and well skilled in a field are known to perform excellently well in work places. Skills enable individuals to adapt to new challenges and opportunities as well as enhance job performance and career prospects. In the same vein, Faraday Africa (2024) acknowledged that acquiring new skills equips individuals with the tools and knowledge needed to navigate unfamiliar territories and embrace new opportunities. The interest of this study about skills acquisition centres on AI. The field of AI is rapidly evolving and it is essential for OTM educators to stay updated. Application of AI in OTM can free educators from the repetitive mechanical work, so that they can have more time and energy to focus on the cultivation of students' high-level thinking and innovation ability, making "teachers" become real masters and coaches. Developing skills in AI is crucial for educators to enhance instructional delivery in the classroom to enhance their instructional delivery. Educators can create more personalized learning experiences for students. AI skills in content design, AI-powered writing assistance skills, simulation games, online learning management platforms among others will enable educators to create innovative and engaging instructional materials that cater for the needs of diverse learners. By acquiring these skills, OTM educators can enhance their instructional effectiveness and better prepare students for the digital workplace. Attention is given to AI-powered writing assistance and Online learning management skills in the study.

II. LITERATURE REVIEW

AI-powered writing assistance skills are the abilities to effectively use AI-powered writing assistance tools to increase efficiency and quality of academic writing. In today's fast-paced digital world, the demand for high-quality content is at an all-time high. This aligns with Hasselgren and Jönsson in Dong (2023) that there is a growing interest in exploring the use of artificial intelligence (AI) in academic writing pedagogy to provide more efficient and objective feedback and assessment. OTM educators for instance, are expected

to produce engaging and original content that resonate with their target learners. With the help of advanced algorithms and machine learning, AI-powered writing tools can assist OTM content educators in generating well-crafted and compelling content in a fraction of the time it would take a human.

There are various types of AI-powered writing tools and the ability of the OTM educators to use them is essential. Some of these tools include: Grammarly, Wordtune, QuillBot, Jenni-AI and ChatGPT.Grammarly which serve as online grammar checker that allow users to identify and rectify errors in grammar, pronunciation, punctuation and plagiarism (NurHidayah and Irawati, 2024). In the assertion of Zinkevich and Ledeneva (2021) Grammarly cannot do work for students; it cannot think for them, neither can it write for them, but it can help learners identify the reoccurring writing problems, eliminate them, and monitor progress. Grammarly aims at developing writing skills, reinforce proper revision habits and guide against plagiarism.

Wordtune is a technology that utilises machine learning techniques (Natural Language Processing) that trains the machine to understand and generate natural text based on large data sets of written material (Zhao, 2021). This type of AI-powered digital writing assistant provides rewrite options on highlighted text by altering the sentence structure or replacing words with synonyms while retaining the original meaning.

QuillBotis is an AI-powered writing tool that enhances users writing by providing suggestions once text is entered.QuillBot can help users to write emails, essays, case studies, thesis, blogs, or projects. Nurmayanti and Suryadi (2023) described QuillBot as an online tool that may be used to improve the clarity and professionalism of your writing by rephrasing phrases and sentences, detecting and preventing plagiarism, and summarizing lengthy passages. Klusaite (2024) noted that it has features that enable the users to summarize text, translate it, check it for plagiarism, increase sentence length, and correct the spelling. The main features of QuillBot include grammar checker, paraphraser, co–writer, summarizer, citation generator, plagiarism checker, user guide and blog.

Jenni-AI enhances academic writing by condensing extensive research papers, articles, or essays into a summary using its summarizer and summary generator features. It will require the text to be pasted then the AI tool will distil the core ideas into a clear, concise summary for the user within a short time.

Chat Generative Pre-trained Transformer or ChatGPT is a machine-learning system that autonomously learns from data and can produce sophisticated and seemingly intelligent writing after training on a massive data set of text (Van Dis et al., 2023). ChatGPT generates text in a way that one may easily believe it is actually written by humans (Buriak et al., 2023). In the opinion of Alberth (2023), ChatGPT can write a fairly decent paper, including literature review, if given appropriate prompts. Nath et al. (2023) attested that ChatGPThas been widely used by professionals and students alike to improve their writing skills. ChatGPT provides real-time captioning, machine translation, text writing, summarization and inclusion

Studies have indicated that AI-powered writing assistance is critical in education. For instance, Nazari et al. (2021) found that AI-powered writing tools could be an efficient tool to promote learning behaviour and attitudinal technology acceptance through formative feedback and assessment for non-native postgraduate students in English academic writing. Similarly, Dong (2023) revealed that the AI-powered writing tool positively impacted students' writing proficiency, as evidenced by significant improvements in writing scores from the pre-test to the post-test. The study of Liu et al. (2018) revealed that AI-powered pedagogy in academic writing has shown promising results in improving students' writing skills and reducing the workload of teachers. However, literature is lacking in terms of AI-powered writing assistance in OTM.

The next set of skills to be considered in the study is online learning management. These skills are essential in learning management systems (LMS). LMSs are online platforms such as Schology, Zoom, Moodle and Canvas that enable the delivery of materials, resources, tools, and activities to students. They serve as a central hub for instructional content, allowing instructors to create, distribute, and assess learning

materials. The importance of LMS skills in instructional delivery is profound. OTM educators today must possess a diverse set of skills in order to effectively utilize Learning Management Systems (LMS) in their teaching practices. These skills encompass both technical proficiency and pedagogical expertise, allowing them to create engaging and interactive online learning experiences for their students. OTM educators must have a strong grasp of the technical aspects of LMS in order to navigate the system effectively and troubleshoot any issues that may arise. This includes proficiency in using various multimedia tools, creating discussion boards, and managing students' data. Others are facilitating online discussions to promote collaboration and critical thinking; monitoring and moderating students' interactions to ensure a positive learning environment. In addition, OTM educators must also possess strong pedagogical skills to design and deliver effective online instruction through LMS. This includes the ability to create engaging multimedia content, facilitate meaningful discussions, assess and evaluate students learning outcomes. Others include the ability to encouraging active participation and critical thinking through online forums and providing timely feedback to guide student learning and reflection.

OTM educators who possess these skills are better equipped to engage students, personalize learning, provide feedback, and foster collaboration. By honing their LMS skills, OTM educators can create a dynamic and enriching learning environment for their students. According to Clarity Innovations (2014), LMSs skills enable teachers to offer tailored instruction that can be accessed by students anytime, anywhere without geographic constraints. LMSs skills also enable instructors to deliver content in various formats, such as videos, audio, audio-visual; administer quizzes, and use discussion boards which help to enhance students' performance. This aligns with Duran and Espino (2024) that the ability of teachers in the utilization of learning management system affect the students' academic performance. In the same vein, Crouse-Machcinski (2019) noted that utilizing LMS effectively in tutor training programmes, institutions of learning can raise their quality of tutors and contribute to the success of their students through these tutors. Furthermore, Furqon et al. (2023) revealed that the ability to utilize LMS has a beneficial effect on academic performance among students and foster a favourable perception of LMS implementation in educational endeavours.

Statement of the Problem

OTM educators in polytechnics are saddled with the responsibility to inculcate sound moral and academic ingenuity in learners through effective instructional delivery. In the 21st century, technology has emerged as the game changer in improving teaching and learning. Technology like AI has the ability to engage learners meaningfully and motivating them to learn. AI is designed in such a way that it can encourage personalized learning, which is relevant to all types of learners. However, using AI for instructional delivery would be an additional responsibility which most OTM educators were not initially prepared for, since AI is newly adopted in the school system for teaching and learning. This could give reason for why most OTM educators seem not capable in using AI for effective instructional delivery. As a matter of fact, they cannot teach with tools which they are not conversant with. It therefore, suggests that OTM educators must first of all, acquire relevant AI skills to enable them use AI tools in teaching. The main problem is that AI integration is new in education system and research in this area is inadequate especially among OTM educators in North-East, Nigeria. Based on this backdrop, it became imperative to investigate skills acquisition in AI as correlate to OTM educators' instructional effectiveness.

Purpose of the Study

The main purpose of the study is to determine skills acquisition in artificial intelligence as correlate to Office Technology and Management (OTM) educators' instructional effectiveness in public polytechnics in North-East, Nigeria. Specifically, the study will ascertain the:

1. Relationship between AI-powered writing assistance skills and OTM educators' instructional effectiveness in public polytechnics in North-East, Nigeria.

2. Relationship between online learning management skills and OTM educators'

instructional effectiveness in public polytechnics in North-East, Nigeria.

Research Questions

The following research questions will guide the study:

1. What is the relationship between AI-powered writing assistance skills and OTM educators' instructional effectiveness in public polytechnics in North-East, Nigeria?

2. What is the relationship between online learning management skills and OTM educators' instructional effectiveness in public polytechnics in North-East, Nigeria?

Hypotheses

The following null hypotheses were formulated for the study and tested at 0.05 level of significance:

1. There is no significant relationship between AI-powered writing assistance skills and OTM educators' instructional effectiveness in public polytechnics in North-East, Nigeria.

2. There is no significant relationship between online learning management skills and OTM educators' instructional effectiveness in public polytechnics in North-East, Nigeria.

III. METHODOLOGY

Correlational research design will be adopted in the study. The population of study comprise 64 OTM educators in ten public polytechnics in North-East, Nigeria. The entire population will be used due to its manageable size, hence, there is no sample. Two research instruments entitled: Artificial Intelligence Skills Acquisition Test (AISAT) and Instructional Effectiveness Rating Scale (IERS) will used for data collection. AISATcontained twenty (20) objective items developed using a test blue print to cover two (2) content areas; divided into two clusters. Cluster 1: AI-powered writing assistance skills (10 items) and cluster 2: online learning management skills (10 items). IERS was a-4 rating scale questionnaire containing 10 items; making a total of 30 items in both instruments. Both instruments will be validated by experts and tested for reliability using K-R 20 for AISAT and Cronbach Alpha Coefficient for IERS. The result obtained for AISAT was 0.79, while IERS had reliability coefficient of 0.86. These results indicate that the instruments are suitable for use in the study. Data collected will be analysed using Pearson Product Moment Correlation Coefficient (r) to answer the research questions, while the null hypotheses will tested using regression.

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