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ARTIFICIAL INTELLIGENCE EFFECTIVENESS IN SKILL ACQUISITION AND WORKFORCE PREPARATION AMONG VOCATIONAL EDUCATION STUDENTS IN UNIVERSITY OF DELTA AGBOR, DELTA STATE

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Abstract

The aim of this paper is to examine artificial intelligence effectiveness in skill acquisition and workforce preparation among vocational education students in University of Delta Agbor, Delta State. Population of the study comprises (120) male and female vocational education students. Random sampling technique was used to select 40 male and 80 female vocational education students for the study. Questionnaire was the instrument used for data collection. Data collected was analyzed using mean and standard deviation to answer the research questions. SPSS version 2.5 statistical tool was used for the analysis, while t-test was used to test the null hypotheses at 0.05 level of significance. The findings of the study show that AI-based tools (e.g., chatbots, speech recognition software) have helped learners to improve their spoken communication skills. AI-assisted platforms have improved learners' ability to analyze and solve practical problems during vocational field work for instance Industrial Tainting (IT) exercise. The study concluded that AI-based tools (e.g., chatbots, speech recognition software) need to be used by vocational education teachers since it helps learners to improve their spoken communication skills, there is needs for vocational students to use AI-assisted platforms to improve learner's ability, to analyze and solve practical problems during vocational field work. The study recommended that vocational education students should use AI skill to handled duty assigned to them effectively at the workforce preparation and vocational education students should use AI problem solving skill effectively during workforce preparation

Keywords: Artificial intelligence effectiveness, skill acquisition, workforce, preparation, vocational, education, students, universities

Introduction

The world's steady innovative changes have shown that the future is changeable especially as it concerns vocational education, knowledge, skills, competencies and technology which are considered as the bedrock of economic, social and political growth. AI refers to an Artificial Intelligence application that enables one to mechanically gain knowledge of and become skilled, experience, despite the system is not clearly programmed (Ogurlu & Mossholder, 2023). Artificial Intelligence refers to the simulation of human intelligence in machines that are programmed to think, learn, and problem-solve in ways similar to humans. According to Alam (2021), artificial intelligence technological development in the world poses many challenges and opportunities, and perhaps the most increased competition among institutions, enterprises, around markets in changing competitive environment, where knowledge, technology, research and development activities have become gradually more relevance as the leading advantage of contemporary economics and strength of nations and the institutions are measured by their progress in applying artificial intelligence skill during teaching and learning. Artificial intelligence (AI) and machine learning are poised to revolutionize the educational landscape by providing personalized learning experiences for teachers and students. For teachers, this means creativity awareness to tools

that can adapt to the learning process and style of individual students in vocational education that offer real-time feedback and generate an insight into students' performance that can give instructional strategies. Adamopoulou and Moussiades (2020) state that artificial intelligence (AI) is a broad field that encompasses various techniques and approaches used to build intelligent machines capable of performing tasks that typically require human intelligence. It is transforming vocational education practices in various ways including personalized learning systems and tailors entrepreneurship education to individual student's needs, skills and learning styles. The knowledge of programming languages is a foundational skill vocational education students developed from AI systems during learning period. According to Berglund et al (2020), artificial intelligence system can also comprehend and generate human language, enabling them to communicate with humans; it is an Artificial Intelligence system that uses algorithms to process data, learn from experiences and the system rely on high-quality data to learn, improve and make accurate decisions. Berglund et al further state that the system requires significant computing power to process large amounts of data and perform complex tasks. The artificial intelligence systems use sensors to perceive the environment and actuators to interact with the physical world. The types of Artificial Intelligence include narrow or weak, general or strong and super intelligence. It is a machine that can be made to simulate aspect of learning effectively. Vocational education students are regarded as expertise that uses AI dataset skill in handling, structuring, and processing large datasets, including data warehousing and modeling at workplace across Nigeria specifically in Delta State. The understanding of machine learning ML skill helps to algorithms the implementation for tasks like learning, reasoning, and decision-making.

Vocational education is the type of education that assists individual to acquire skills, which they can apply to solve problems in agricultural occupation. According to Nwaigburu and Eneogwe (2019), vocational education has a definite role in preparing and equipping students with skills that increase their chances of finding jobs across territorial boundaries after schooling. The integration of artificial intelligence (AI) into educational environments, particularly within vocational education programmes in tertiary institutions, presents a complex array of challenges regarding students' retention and the development of critical thinking. Central to this issue is the potential erosion of traditional modes of engagement and interaction between students and instructors. With the increasing adoption of AI-powered tools and platforms, there is a growing concern about the diminishing role of direct human interaction in classrooms. Furthermore, the growing reliance on AI-driven systems for tasks such as grading, feedback provision, and personalized learning interventions poses a significant threat to students' critical thinking skills. The critical thinking skills and soft skills are fundamental for all individuals who hope to partake in the global labour force (Adams, 2017). It is universally acknowledged that vocational education students must possess soft skills besides the academic qualification which today is not a measurement of true abilities of the individual. This is why stakeholders in education including employers of labour are concerned about vocational education students' acquisition of skills relevant to today's world of work. Though vocational education students may have acquired necessary subject specific skills, it is not sufficient for them to be recruited. The soft skill is proficiency with different AI models of tools used to build and deploy to design different knowledge of workforce, such as neural networks. Although, knowledge of how to design and interact with user-friendly interfaces powered by AI. while the cognitive and critical thinking skills is beyond technical aspects of AI skill vocational education students acquire to handle position in the workforce

Statement of the Problem

Limited access to AI resources and infrastructure is a significant challenge in integrating Artificial Intelligence (AI) into vocational education practice. AI requires powerful computational

resources, such as high-performance Graphic Processing Unit (GPUS), Transpulmonary Ultrasound Dilution (TPUD) or cloud computing services. Limited access to these resources hinders entrepreneur's ability to develop and train artificial intelligence models. Also, limited to access to data centers cloud storage, or data management tools make it difficult for entrepreneurs to handle large dataset. According to Abdulkadir (2018), access to AI software, frameworks and tools, such as tensor flow, PYTorch or Scikit-learn, is crucial for developing AI applications as limited access to these resources may restricts student's ability to build and deploy AI models effectively during learning. The overflow of the challenges showed that teachers and students may not have the necessary knowledge and skills to effectively integrate artificial intelligence into vocational education. The limited understanding and knowledge of artificial intelligence concepts, technologies and applications among vocational education students and professionals is a challenge that called question: i) would low access to AI affect students' interest in learning of vocational education? ii) would artificial intelligence improve students' acquisition of vocational skills?

Research Questions

The following questions was use to guide the study

i. what is the artificial intelligence effectiveness communication skill acquisition among vocational education students in University of Delta Agbor?

ii. what is the artificial intelligence effectiveness problem solving skill acquisition among vocational education students in University of Delta Agbor?

Hypotheses

The following hypotheses was use to guide the study

H_{01}: there is no significant difference between the mean response of male and female students on artificial intelligence effectiveness on communication skill acquisition and vocational education students in University of Delta Agbor,

H_{02}: There is no significant difference between the mean responses of male and female students on artificial intelligence effectiveness on problem solving skill acquisition and vocational education students in University of Delta Agbor,

Literature Review

Artificial Intelligence

Artificial Intelligence (AI) is a branch of science which deals with helping machines finding solutions to complex problems in a more human-like fashion. This generally involves borrowing characteristics from human intelligence, and applying them as algorithms in a computer friendly way. Artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines in contrast to natural intelligence displayed by humans and other animals (McCorduck, 2024). It is a branch of Computer Science that pursues creating the computers or machines as intelligent as human beings. It is the science and engineering of making intelligent machines, especially intelligent computer programs.

Skill Acquisition

The acquisition of relevant skills is a tool of increasing and boosting the productive power-base of the nation. Skill acquisition is the process of possessing effective and ready knowledge in developing one's aptitude and ability in a particular field (Okoro, 2018). Skills acquisition programme is meant for self-reliance which is available in most of the country. Business Education is primarily education for skill acquisition, vocation and competency based.

Workforce Preparation

The concept of workforce preparation is a serious issue in human resource development. This is because preparation is one of the functions of human readiness toward activities needed to be carried out. Preparation is the first process that human resource personnel execute before recruitment, selection, placement, training, promotion, performance appraisal, and compensation. Workforce preparation is therefore a process carried by the human resource experts or personnel to ascertain the accurate number of workforces needed in the organization Mintzberg (2023). Williams (2022) said that Industrial training (IT) helps students develop professional attitudes, organizational skills, and communication skills used in workplace at any period of time. Adams (2017) stressed that the SIWES or Industrial Training is an advance or a more formal form of apprenticeship programme which is geared towards skill acquisition and development. Adam said that IT is a skill experience used to prepare vocational education students for the aim of self-employability in time to come. Oyedele (2020) noted that the programme helps the students to concretize knowledge and enable them to do the work well.

Vocational Education

According to the definition by UNESCO and the International Labor Organization (ILO, 2021) vocational education refers to “aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupants in various sectors of economic and social life" (UNESCO and ILO, 2021). Maduka (2019) defined vocational education “a type of education deliberately designed for the development of skills and knowledge which can be useful to both the individual concerned and the society.” Akaninwor (2024) defines vocational education as a type of education or training designed for preparing the individual learner to earn a living (to be self-reliant). Vocational education, as part of a general education programme, essentially constitutes any form of education with the primary purpose of preparing people for useful employment in a recognized occupation (Okoro, 2023).

Artificial Intelligence Effectiveness Communication Skill Acquisition Among Vocational Education Students in University of Delta Agbor

Artificial intelligence is now widely used to facilitate social interaction. It changes how people interact with and perceive one another in pro-social and anti-social ways. By using algorithmic responses, communication skill efficiency increases the use of positive emotional vocational education knowledge to interact with students, and positive evaluations by communication teachers. AI applications is that AI-generated reply suggestions in text-based communication skill acquired by vocational education students, commonly known as a smart reply, which seems to help users compose learning messages with “just one tap” (Hohenstein, and Smith, 2023). In as much as communication is the basic process through which students form perceptions of others, build and maintain social relationships and achieve cooperative outcomes, generative artificial intelligence AI applications such as chatbots, visual assistants, chat GPT, and Ask-AI are increasingly used to produce any kind of teaching language, from text messages and social media posts to computer programs and speeches. It

also answers our questions and speaks with us in a manner we comprehend (Hohenstein, Smith, and Chie, 2023).

One of the most pervasive applications nowadays is personalized reply suggestions in text-based communication commonly known as smart replies used by vocational education students and teachers. Smart reply systems aim to make text production more efficient by drawing on general text corpora to predict what a person might type and generate one or more suggested responses that the person can choose from when responding to a message. Artificial intelligence AI effectiveness has focused on how to reproduce aspects of human intelligence, including the ability to communicate effectively with students, teachers and parents within the machine (Frankish & Ramsey, 2024). Recent advances in Artificial intelligence effective communication skill acquisition have led to more powerful and consequential AI technologies being integrated across daily life (Campolo and Hohenstein, 2017). Individuals routinely chat with Amazon's Alexa, Apple's Siri, Google Assistant, and other digital assistants and people's interactions with smart devices are expected to grow along with the emerging internet of things.

Artificial Intelligence Effectiveness Problem Solving Skill Acquisition among Vocational Education Students in Universities of Delta Agbor

On the other hand, problem solving skills are highly sought by employers of many companies who rely on their employees to identify and solve problems with AI. It is the most important skill vocational education students must have when they start life after graduation. In this 21st century, one of the objectives of education is raising individuals, who can apply the information they learn to solve problems, develop strategies, and transfer their knowledge (Rainie & Anderson, 2017). Problem solving abilities are important skills for vocational educational area because a healthy society or a healthy nation can only maintain its existence through adopting themselves into new conditions that need adequate attention (Incebacat& Ersoy, 2024). The element of this process is to understand the problem, choosing the necessary information among the given choices, and reaching the solution after performing the necessary operations. On the other hand, Saygili (2017) noted that the stages of effective problem solving include the following: i. Problem identification: This stage involves detecting and recognizing that there is a problem, identifying the nature of the problem and defining the problem. ii. Structuring the problem: This involves careful observation, inspection, fact finding and developing a clear picture of the problem and to increase understanding, iii. Looking for possible solutions, at this stage possible courses of action is being generated by letting each person in the group express their views on possible solution.

Gomez (2024) also explained that problem solving skills involves the ability to identify problems, look at them objectively, decide based on facts, develop practical and creative solutions, and follow a process to solve them without being overwhelmed by them or being dependent on others to solve them. Even the hardest problems can be solved with the right mindset and working systematically towards a solution.

Theoretical Framework

Skill acquisition theory, according to Dekeyser (2017), "is that the knowledge of a broad diversity of skills shows a remarkable similarity in development from initial representation of knowledge through initial changes in behavior to eventual fluent, spontaneous, largely effortless, and highly skilled behavior, and that this set of phenomena can be accounted for by a set of basic principles

common to acquisition of all AI skills that are needed to utilized by vocational education student's at workforce (Dekeyser, 2017). In sum, as mentioned by Speelman (2005), skill acquisition can be considered as a specific form of learning, where learning has been defined as "the representation of information in memory concerning some environmental or cognitive event". In other words, this theory assigns roles for both explicit and implicit learning with the application of artificial intelligence AI. The overview of this theory indicates that artificial intelligence facilitates vocational education students learning, it claims that students learning something improved through large availability and effectiveness of network, and with subsequent sufficient practice and exposure, move into implicit processes. The development, within this theory, entails the effectiveness of artificial intelligence declarative knowledge followed by procedural knowledge discovered as skill when learning with artificial intelligence.

Methodology

The study employed descriptive a survey research method. The study was carried out in University of Delta, Agbor Delta State. The population of the study comprises of (210) male and female vocational education students. Simple Random sampling technique was used to select 40 male and 80 female vocational education students. Yamane's statistical formula was used to determine the sample size. Questionnaire was the instrument used for data collection. Questionnaire contained 10 items that was administered to the respondents. The instrument was validated by 2 experts in the Department of agricultural and educational foundation of Delta State University, Abraka. The respondent's responses were based on five (5) point Likert rating scale of Strongly Agreed (SA), Agreed, disagreed (D) strongly disagreed (SD), and Undecided (UN). Data collected was analyzed with mean and standard deviation while t-test statistical tool was used to test the null hypotheses at 0.05 level of significance. The decision rule for the study is that any mean rating score of 3.00 and above was considered accepted while any mean rating score below 3.00 were considered not accepted.

Results

Research Question One

What is the artificial intelligence effectiveness communication skill acquisition among vocational education students in University of Delta Agbor?

Table 1: Showing Respondent Score on Artificial Intelligence Effectiveness Communication Skill Acquisition among Vocational Education Students in University of Delta Agbor

S/N	Item on Artificial Intelligence Effectiveness Communication Skill Acquisition among Vocational Education Student	X	S.D	Remark
1	AI-based tools (e.g., chatbots, speech recognition software) have helped me improve my spoken communication skills.	3.45	0.71	Accepted
2	Students feel more confident communicating in professional settings after using AI-assisted language learning platforms.	3.56	0.61	Accepted
3	Feedback provided by AI tools has been helpful in correcting learners communication mistakes.	3.63	0.79	Accepted
4	AI applications have made it easier for students to practice communication skills outside the classroom.	3.69	0.54	Accepted

5	Using AI has enhanced learner's vocabulary and grammar in both written and verbal communication.	3.73	0.50	Accepted
	Grand/Mean/S.D	3.61	0.63	Accepted

The data presented in table 1 shows that respondents agree with all the item listed in the table are artificial intelligence effectiveness communication skill acquisition among vocational education students in University of Delta Agbor grand with a grand means score of 3.61 while standard deviation as 0.63 which is greater than 2.50 decision rule benchmark below.

Research Question 2

What is the artificial intelligence effectiveness problem solving skill acquisition among vocational education students in University of Delta Agbor?

Table 2: Showing Mean Score of Respondents on Artificial Intelligence Effectiveness Problem Solving Skill Acquisition among Vocational Education Students in University of Delta Agbor

S/N	Item on Artificial Intelligence Effectiveness Problem Solving Skill Acquisition among Vocational Education Students	**X**	**S.D**	**Remark**
6	AI-assisted platforms have improved learners ability to analyze and solve practical problems during vocational field work.	3.33	0.71	Accepted
7	AI simulations and virtual labs have enhanced earners hands-on problem-solving abilities.	3.8	0.39	Accepted
8	AI systems provide helpful feedback that guides problem-solving process.	3.83	0.57	Accepted
9	Working with AI-based tools encourages learners to think critically and explore multiple solutions.	3.49	0.500	Accepted
10	AI-based problem-solving scenarios are more effective than traditional textbook exercises.	3.45	0.64	Accepted
	Grand/Mean/S.D	3.59	0.57	Accepted

The data presented in table II shows respondents agree with all the item listed in the table are artificial intelligence effectiveness problem solving skill acquisition among vocational education students in University of Delta Agbor with a grand mean score of 3.59 while standard deviation as 0.57 which is greater than 2.50 decision rule benchmark below.

Test of Hypotheses

There is no significant difference between the mean response of male and female students on artificial intelligence effectiveness on communication skill acquisition and vocational education students in University of Delta Agbor,

Table 3 Showing t-Score on Artificial Intelligence Effectiveness on Communication Skill Acquisition and Vocational Education Students in University of Delta Agbor,

Gender	**No.**	**X**	**S.D**	**Df**	**t-cal. Value**	**t-crit. Value**	**Alpha level**	**Decision**

Male student	40	3.49	0.75					
Female students	80	3.58	0.69	118	0.64	1.96	0.05	Accepted

The above table shows that there is no significant difference in the means response of male and female students on hypothesis tested. From the table, t-calculated value of 0.64 is lower than the t-critical value of 1.96 at 0.05 alpha levels. Since the t-calculated value is lower than t-critical value the hypothesis stated for the study is accepted.

There is no significant difference between the mean responses of male and female students on artificial intelligence effectiveness on problem solving skill acquisition and vocational education students in University of Delta Agbor,

Table 4: Shows t-score of Artificial Intelligence Effectiveness on Problem Solving Skill Acquisition and Vocational Education Students in University of Delta Agbor

Gender	**NO.**	**X**	**S.D**	**Df**	**t-cal. Value**	**t-crit. Value**	**Alpha level**	**Decision**
Male students	40	3.40	0.86					
Female students	80	3.61	0.63	118	1.43	1.96	0.05	Accepted

The t-table above showed that there is no significant difference in the means response of male and female students on hypothesis tested. from the table, the t-calculated value of 1.43 is lower than the t-critical value of 1.96 at 0.05 alpha level. Since the critical vale is higher than the calculated value, the null hypothesis stated for the study is therefore accepted.

Discussion

The study revealed that all the items listed under research question 1 are agreed to by respondents. The finding showed that AI-based tools (e.g., chatbots, speech recognition software) have helped learners improve their spoken communication skills, respondents strongly agreed that students feel more confident communicating in professional settings after using AI-assisted language learning platforms. The finding is in agreement with study carried out by Hohenstein et al., (2023) who said that feedback provided by AI tools has been helpful in correcting learners communication mistakes. From the findings, respondents agreed that AI applications have made it easier for students to practice communication skills outside the classroom and while study carried out by Frankish & Ramsey, (2024) who stated that using AI has enhanced learners' vocabulary and grammar in both written and verbal communication of vocational education students of many universities. The findings are in line with Campolo et al., (2017) who opined that individual routinely chat with Amazon's Alexa, Apple's Siri, Google Assistant, and other digital assistants can easily improve students' interactions with smart devices that are grown along with the emerging internet of things.

The finding of the study revealed that AI-assisted platforms have improved learners ability to analyze and solve practical problems during vocational field work for instance Industrial Tainting (IT) exercise. Respondents agreed that AI simulations and virtual labs have enhanced learners hands-on problem-solving abilities. This finding adopted study carried out by Rainie & Anderson, (2017) who said that AI systems provide helpful feedback that guides problem-solving process for vocational education students, while respondents strongly agreed that working with AI-based tools encourages learners to think critically and explore multiple solutions. The findings revealed that AI-based problem-solving scenarios are more effective than traditional textbook exercises. The finding is in agreement with Incebacat & Ersoy, (2024) who said that problem solving abilities are important skills for

vocational educational area because a healthy society or a healthy nation can only maintain its existence through adopting themselves into new conditions that need adequate attention.

Conclusion

The utilization of artificial intelligence in acquiring skill acquisition by vocational education students has made them career person in the society. AI-based tools (e.g., chatbots, speech recognition software) need to be used by vocational education teachers since it helps learners to improve their spoken communication skills. There is need for vocational education students to be confident in communicating professional settings after using AI-assisted language learning platforms. There is need for vocational students to use AI-assisted platforms to improve their learner's ability, to analyze and solve practical problems during vocational field work for example Industrial Tainting (IT) exercise.

Recommendations

i. Vocational education students should use artificial intelligence skills to communicate effectively in the workforce preparation.
ii. Vocational education students should use AI skill to handled duty assigned to them effectively at the workforce preparation
iii. Vocational education students should use AI problem solving skill effectively during workforce preparation

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