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USE OF AI FOR EFFECTIVE TVET PROGRAMME DELIVERY IN PUBLIC UNIVERSITIES

Reinforcing the Teaching of TVET Programme Through the use of AI for Effective Lesson Delivery in the Public Universities

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Abstract

Research Objectives: The study posed to determine the various measures for reinforcing the teaching of Technical Vocational Education and Training TVET programme through the use of artificial intelligence. Thus, any attempt to reinforce the teaching of Technical Vocational Education and Training TVET Programme should address the effective lesson delivery of the programme. Effective lesson delivery in TVET has been the measure rudiment in the teaching and learning in this digital era to achieve its objectives. As the world is changing from paper qualifications to manipulative skills, effective lesson delivery of TVET programmes in the public universities is to help in making the recipients self-reliant. Due to innovation in technology, the usual lecture method used in the Public Universities is becoming an outdated trend notwithstanding its relevance in the foundation stage of TVET Programme. TVET Educators/ Lecturers being the human resources responsible for initiating the learning, is to diversify and update their lesson delivery strategies. This paper, therefore X-rayed the contribution of Artificial Intelligent to the lesson delivery of TVET programmes which include; improving the efficiency amongst the students thereby allowing them to learn at their pace, AI tools used in teaching TVET programmes includes; Chatbots and AI powered automated grading. The study also revealed the measures of reinforcing the teaching of TVET Programme through the use of Artificial Intelligent for effective lesson delivery which include; studying and understanding of AI tools one intends to use and setting of TVET learning objectives where AI can provide support.

Recommendations: researchers recommended that among others that the TVET Educators in the public universities in Enugu State in particular and Nigeria is to get themselves trained on these new innovative teaching tools in order to effectively deliver their lesson so as to achieve the objectives of TVET Programme. The government and stakeholders should also provide the necessary AI facilities that will aid the reinforcing of the teaching of TVET programmes.

Key words*: Teaching, Reinforcing, Lesson Delivery, Artificial Intelligent and TVET Programme.*

Introduction

Education system needs to be restructured in order to provide the recipient (youth) the needed competency to become self-employed and relevant in the labour market (Mbah and Elobuike, 2016). Hence, the type of education that can help in achieving this result includes Technical and Vocational Education and Training (TVET).

TVET can be said to be a skill oriented programme whose objective is to achieve the needs of society based on the opportunity that it provides to the recipients to acquire skills, making them to think independently. Technical and Vocational Education and Training TVET according to Ojimba (2012) in Okolocha and Baba (2016) is a form of education whose primary aim is to prepare an individual for employment in recognized occupation in an encompassed field of study (agricultural education, fine and applied art education, business education and vocational trades in soap making, hairdressing, computer training among others). Thus, TVET can be viewed as a programme that trains and develops individuals in the fields of vocation and technology to become experts, so that the nation can enjoy the good fruit of technology through her contribution to the overall technological development of the world.

TVET can be classified into three categories; Non-formal, Formal and Informal TVET programmes. Informal TVET programme is a kind of programme whose learning and training is based on an apprenticeship system where the master craftsman decides out of experience what the apprentice learns. Thus, this kind of programme is slated to take place at roadside mechanics workshop, electrical workshop and furniture workshop among others. Following this kind of programme, one might decide to get certified through subscribing to an organized non-formal TVET programme. Non-formal TVET programme is the kind of programme which normally takes place in the skill acquisition centers in form of short courses, workshops or seminars in all the trades (Alio & Ideh, 2022). According to them, any trainee that passed through this programme can decide to acquire additional higher training in higher institutions which is known as formal TVET programmes.

Formal TVET programme can be referred as an organized technical and vocational education, whose programmes is being carried out in an approved public or private educational or training institution, with a structured curriculum, with her objectives and time of learning fixed, which constitutes a continuous ladder, where one level leads to the next and finally leads to certification (Alio & Ideh, 2022). TVET can be said to be a solution provider since it has a wide diversified education system instrumental in making remarkable contributions to economic growth of a nation, by the production of suitable manpower relevant to the needs of industry, society and changing technological work environment. This is one the reasons that made the

National Board for Technical Education (NBTE,2010), structured the TVET programmes to be offered in post primary and tertiary institutions to enable students to develop saleable skills for service and production occupations.

With reference to the study, the study concentrated on the TVET programme in the public university setting. Thus, the study respectively revealed that TVET programmes in public universities include; agricultural education, industry technology education, business education, home economics education, fine and applied arts and computer education. The curriculum design of this programme as offered in higher institution is structured into three components; General education which accounts for 30% of the total hours required for the programme, Trade theory, trade practice and related studies which accounts for 65% of the total hours required for the programme and Supervised industrial work experience SIWES which accounts for about 5% of the total hours (NBTE, 2010). In order to achieve the design of the curriculum regardless of the challenges confronting the programme, it calls for TVET educators in the public universities to employ the use of technology tools in teaching.

Teaching according to Mbah and Umurhurhu, (2016) is any action geared towards making another person to learn. Teaching can take place in different locations, of which public university is one of them. In the context of the study, the public universities in Enugu include; University of Nigeria, Nsukka UNN and Enugu State University of Science and Technology, Enugu ESUT. Different public universities have been established by the government and were suited in the different states. Thus, UNN and ESUT are suited in Enugu State. Enugu State being one of the States in the Southern East region of Nigeria, which is located at the latitude 6^{o} 25" N and 7^{o} 03" N of equator and 7^{o} 25 E and 8^{o} 19 E of Greenwich meridian, have contributed to her society by ensuring that the governments established Universities in their state. Consequently, the public universities in this state have not experienced innovative technological tools in delivering their instructions in the classroom. In order to achieve the objectives of TVET programmes in these Universities, the lesson delivery of the TVET programmes is to be reinforced.

Reinforcement is the action of strengthening or encouraging something. With reference to the study, reinforcing the teaching of TVET programmes could be the activities carried out, anticipated changes and added teaching tools the teacher integrated in the TVET instructional activities, in making the lesson delivery to become better. One of the ways the teaching of TVET programmes in the public universities in Enugu State can be reinforced is through the use of Artificial Intelligent AI.

AI in education refers to the use of artificial intelligence technologies, such as machine learning and natural language processing, used in enhancing the learning experience (Alneyadi, Saif, Wardat, Alshannag, & Abu-Al-Aish, 2023). One can say that AI involves the use of

algorithms in analyzing data, identifying patterns and make predictions which enables the educators to personalize learning for each student (Khan, Ahmed, Al-Bahrani, Khan, Asif Ullah, Ali, Sharafat, Hassan, Tajamul, Ismail, Ahmed, & Zahid,2022). Personalized learning which happens to be one of the most significant advantages of AI in education, is found to be lead the students to a better outcomes, as students can learn at their own pace and in a way that suits their learning style (Shrivastava, , Prasad, Yeruva, Mani, Nagpal, & Chaturvedi, 2023).

Thus, AI is said to provide better data analysis, enabling educators to make data-driven decisions. It is said to improve student engagement by providing interactive and engaging learning experiences (Yang, Hesami, Nazemipool, Elnaz, Bahadoran, Al-Bahrani, & Azizi, 2022). With the help of AI, education can be made more accessible and inclusive, enabling learners of all backgrounds to access high-quality education. Following the innovative trends in teaching, the study will delve deeper into the applications of AI in education, including personalized learning, intelligent tutoring systems, chatbots, and grading and assessment. Finally, the study explores the different AI Tools used in the teaching of TVET Programme, the measures of reinforcing the teaching of TVET programmes through the use of AI and the contributions of AI in lesson delivery of TVET programmes.

Contributions of AI in the Lesson Delivery of TVET Programme

Personalized Learning

Personalized Learning

AI helps in personalizing the learning experience of TVET students, allowing them to learn at their own pace, according to their individual needs and abilities. This leads to improved learning outcomes and increased student engagement. The use of artificial intelligence (AI) in education has enabled personalized learning, revolutionizing the way students learn (Rana, Ajay, Shrivastava, Verma, Ansari, & Singh, Devender 2022). Thus, AI helps in analyzing the students' past performance to identify areas of difficulty and provide targeted support in those areas (Alarabi & Wardat, 2021). With this, one is assured that there will be increased efficiency in the lesson delivery of the TVET programme.

Increased Efficiency

AI being a tool in automating repetitive tasks such as grading, data analysis, and administrative tasks, freeing up time for teachers and students to focus on more meaningful tasks to lead to efficient teaching and learning . AI adapts to the student's learning pace, thereby slowing down or speeding up instruction as necessary (Mohammed

Al-Bahrani, Alhakeem, & Cree, 2020). Application of AI as a teaching tool tailors learning experiences to each student's individual needs, strengths, weaknesses, and interests (Samad, Hamza, Muazzam, & Ahmer, Sania, & Mumtaz, 2022). AI uses technology to adapt instruction to each student's level and pace of learning (Zarei, Taghizadeh, Naseri, Al-Bahrani, & Khordeh Binan, 2022). One of the primary benefits of AI is that it helps to ensure that each student receives the support and guidance they need to reach their full potential. AI also helps the struggling students catch up, while advanced students can be challenged at their level (Gningue, Peach, Jarrah, & Wardat, 2022). Delivery lessons through the use of Intelligent tutoring systems, chatbots, automated grading and assessment increases efficiency, saves teachers' time and provides more accurate and consistent feedback, thereby improving the student's engagement activities.

Improved Student Engagement

AI helps in improving student engagement by providing interactive and engaging learning experiences. For example, chatbots and virtual assistants can make learning more fun and interactive, and adaptive learning technologies can help students stay engaged by presenting material at their level of understanding. Through the application of AI the students get more engaged and motivated to learn, which can lead to better academic performance and higher retention rates (Al-Abboodi, Fan, Mahmood, & Al-Bahrani, 2021). However, one cannot talk about TVET students' performance without talking about an efficient data analysis by the teacher.

Better Data Analysis:

AI can analyze large amounts of data and provide insights into student performance, allowing teachers to better understand their students and tailor their instruction accordingly. AI plays a critical role by using machine learning algorithms to analyze data and identifying patterns in students' learning behaviors, preferences, and achievements (Samad, 2022). AI uses this data to provide tailored learning experiences that meet the specific needs of each student (Samudrala, Yeruva, Jayapal, Vijayakumar, Rajkumar, & Razia, 2022). For example, AI is said to recommend appropriate learning resources, suggest areas for improvement, and adjust the difficulty level of learning tasks. This can lead to improved learning outcomes and better student performance. Having discussed the contributions of AI to the teaching of TVET programmes, the study therefore looks into the AI tools used in teaching TVET programmes.

AI Tools Used in Teaching of TVET Programme

Chatbots

Chatbots

Chatbots are computer programmes designed to simulate human conversation, enabling them to interact with people through text or voice interfaces (Sreenivasu, , Bin, Yeruva, Ajay, Kabat, & Chaturvedi, 2023). In recent years, chatbots have been increasingly used in education, providing personalized support to students, automating administrative tasks, and offering new opportunities for engagement. Chatbots usually act as virtual tutors, providing instant feedback, answering questions, and guiding students through their learning journey (Sridhar, Yeruva, Ajay, Renjith, Dixit, Jamshed, & Rastogi, 2022). Chatbots can also provide personalized recommendations for learning resources, suggest areas for improvement and track progress, providing a more individualized learning experience. Chatbots can handle routine tasks such as scheduling, grading, and answering frequently asked questions, saving teachers' time and enabling them to focus on more high-value tasks such as teaching and mentoring (Gningue, Peach, Jarrah, & Wardat, 2022). TVET educators can also reinforce his strategy through the application of virtual mentors.

Virtual Mentor

The function of AI which is currently quite widely applied to various educational technology platforms, especially those based online, is as a virtual mentor. Mentoring is a process in which a more knowledgeable person (the mentor) assists a less-knowing person (the mentee) in achieving a learning objective. AI can provide feedback on students' learning activities and practice questions, then provide recommendations for material that needs to be re-studied like a teacher or tutor. Virtual Mentor (VM) can be said to be a multimedia-integrated e-Learning environment that stresses interaction, personalization, and intelligence. This AI tool is widely used by professors/lecturers to publish notes, homework, quizzes, and tests that allow students to ask questions, thereby identifying the reasons behind students' misunderstanding and offers solutions that have been released by the lecturer and the programme beforehand. In addition to presenting information in the form of video instruction, Voice Assistant also speaks and explains the information one needs like a personal assistant.

Voice Assistant

This AI technology that relies more on the voice function as a center for interaction and communication. Voice assistant functions through the use of cloud computing and it communicates with the users in natural language (Terzopoulos & Satratzemi, 2019). Several Edutech platforms have also adopted Voice Assistant technology to help students find content and materials more quickly and practically. Voice Assistant allows students to search for materials, reference questions, articles, and books by simply speaking or mentioning keywords. Thus, VA displays the information searched according to the keywords mentioned. In addition to presenting information in the form of text and images, Voice Assistant also speaks and explains

the information one needs like a personal assistant. For the TVET Educator to know if he is making progress, he is to evaluate and grade the students through the utilization of AI Powered Automated Grading.

AI Powered Automated Grading

AI Powered Automated Grading automates the grading and assessment process, providing instant feedback to students and saving educators time and effort (AlAli, Wardat, & Al-Qahtani, 2023). It analyzes student work and provides feedback based on predefined criteria, enabling students to receive immediate feedback on their performance (Al-Bahrani, Gombos, & Cree,2018, Li, Jun, Zhi, Lei, Zhang, & Al-Bahrani, 2022). This system uses natural language processing and machine learning algorithms to analyze student essays and provide instant feedback and scoring. However, the study will look into the measures of reinforcing the teaching of TVET programmes through the use of AI.

Measures of Reinforcing the Teaching of TVET Programme through the use of AI

Studying and Understand the AI Tools

TVET educators spend time studying and interacting with the particular AI to integrate in teaching activities to understand their functionalities. TVET educators are to ask both simple and complex questions to that particular AI in order to see how he responds. He/she is to review available materials on their AI official websites and educational forums to understand the best practices to use in the classrooms. While the TVET educator is studying the AI tools to integrate in teaching, he is to set clear TVET learning Objectives.

Setting of Clear TVET Learning Objectives

TVET educators are to define what he wants the students to achieve through the AI-integrated activity. He is to choose a curriculum area where AI can provide meaningful support or enhancement. This could be on writing, research or on a subject topics where inquiry can be stimulated. TVET educators are to decide on specific learning outcomes, such as improving research skills, enhancing creative writing, or understanding a complex TVET concept. However, to make the teaching meaningful, TVET educators design engaging TVET activities.

Designing of the TVET Activities

TVET educators create an engaging and educational activity that will meet the students' learning objectives. Thus, TVET Educators is to integrate an AI-Assisted research and presentation, that way the students will utilize it in researching a topic related to the current TVET curriculum. Thus, TVET students are to prepare a short presentation or report based on their findings, highlighting how AI contributed to their research activities. TVET educators are to

guide the students on how to interact with AI, including on how to phrase questions and how to critically evaluate the information provided by the AI. TVET educators discuss the importance of verifying information and using multiple sources, given the AI's potential for inaccuracies or "hallucinations".

Conducting a TVET Post-Activity

TVET educators conduct a post-activity session to reflect on the experience of the students during the TVET activities. He is to encourage students to share their experiences, including any instances of AI hallucination and how they addressed it.

Conclusion

Innovation in the industries today demand for a modern and holistic approach in teaching of TVET programmes. Artificial Intelligence has been a supportive teaching tool in education. Its application in teaching has no limit as TVET educators are to get trained and master its applications and ensure to be utilizing it in teaching. Employing the identified measures in the use of AI in the teaching of TVET programmes in the public university setting will go a long way in achieving the aim and objectives of the programme regardless of the challenges it is facing.

Recommendations

For effective lesson delivery of TVET programmes, the following recommendations were made. The government and the stakeholders are to ensure that;

1. The funding of TVET programmes in the public universities is being taken care of.
2. Facilities needed in the integration of AI in the teaching of TVET programmes should be provided.
3. TVET educators should get trained in the use of AI in the teaching of TVET programmes.

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