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Artificial Intelligence (AI) and Instructional Design: Evaluating the Influence of AI Integration in Instructional Planning and Delivery among Teachers in Training in University of Uyo

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Abstract: *The study examined Artificial Intelligence (AI) and instructional design: Evaluating the influence of AI integration on instructional planning and delivery among teachers in training in University of Uyo. The survey research design was adopted for this study. The population consisted of all 1358 level 400 students in the faculty of education, University of Uyo, (Students Affairs Department) from which a sample size of 250 participants representing 18.4 percent of the population size. Mean is used to answer the research questions while related t-test was used for testing the hypotheses at .05 level of significance. The results revealed that there is a significant influence of AI integration on instructional planning among teachers in training in University of Uyo. The result also showed that there is a significant influence of AI integration on instructional delivery among teachers in training in University of Uyo. Based on the findings of the study, it was recommended among others that the Nigerian university commission and University management should implement fully AI integration into teachers training programme in order to equip teachers in training with AI literacy skills.*

Keywords: *Artificial Intelligence, Instructional Design, Instructional Planning and Delivery*

Introduction

The proliferation of Artificial Intelligence technologies has unprecedented revolutionize daily activities among professionals. Ekanem (2019) noted that the growth in interactive, digital and smart technologies has cause a huge change in the interests, needs, expectations development and practice of education. Thus, as AI and other digital technologies become pervasive, professional practices has changed to reflect what goes around outside the conventional learning

environment. The development and integration of AI into the educational sectors among others, have changed the conventional pedagogical process including instructional designs and development. Mureșan (2023) averred that with artificial intelligence, education has undergone a series of changes that come with the opportunity to transform and adapt innovative teaching/learning process. Artificial Intelligence (AI) according to United Nations Children's Fund (UNICEF, 2021) are machine-based systems that can, make predictions, recommendations, or decisions that influence real or virtual environments.

According to Yadrovskaia, *et al* (2023), AI are softwares capable of recognizing speech and visual objects, to perform complex logical operations and analytical calculations and make decisions. These sets of digital tools perform cognitive functions like human by processing natural language, recognizing objects, accumulating knowledge, performing logical reasoning, drawing conclusions, as well as performing reasonable actions. AI refers to the science and engineering of making intelligent machines that solve different kinds of problems via natural language processing, neural network and machine learning.

According to the Council of Europe (2021), AI is a set of sciences, theories and techniques whose purpose is to reproduce by a machine the cognitive abilities of a human being. Current developments aim, for instance, to be able to entrust a machine with complex tasks previously delegated to a human. Equally, the European Union (2021) defined AI as software that is developed with one or more of the techniques and approaches listed in Annex I and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with.

Parliamentary Assembly of the Council of Europe, (2021) also defined AI as computer-based systems that can perceive and derive data from their environment, and then use statistical algorithms to process that data in order to produce results intended to achieve pre-determined goals. The algorithms consist of rules that may be established by human input, or set by the computer itself, which "trains" the algorithm by analysing massive data sets and continues to refine the rules as new data is received. According to United Nations Educational, Scientific and Cultural Organization (UNESCO, 2021) AI systems are information-processing technologies that integrate models and algorithms that produce a capacity to learn and to perform cognitive tasks leading to outcomes such as prediction and decision-making in material and virtual environments. AI systems are designed to operate with varying degrees of autonomy by means of knowledge modelling and representation and by exploiting data and calculating correlations.

AI systems are algorithmic models that carry out cognitive or perceptual functions in the world that were previously reserved for thinking, judging, and reasoning human beings. (Leslie *et al*. 2021) AI is often defined as a computer system with the ability to perform tasks commonly associated with intelligent beings. Today, with the changing nature of AI, it has come to be identified as a scientific discipline; the activity that creates machines that can function appropriately and with foresight in their environment. Artificial Intelligence (AI) is the ability of a digital computer, computer-controlled machine or robot to perform tasks commonly associated with intelligent beings like humans (Robinson, 2018).

On the other hand, The University of San Diego (2023) instructional design is defined as "the systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources, and evaluation". This involves the process by which learning products and experiences are designed, developed, and delivered. These learning products include online courses, instructional manuals, video tutorials, learning simulations, etc. The terms instructional design, instructional technology, learning experience (LX) design, curriculum design, and instructional systems design (ISD), are sometimes used interchangeably." (The University of San Diego, 2023). Simply put, instructional design is creating learning or instructional experiences that facilitate the acquisition of new knowledge.

The concept of instructional design has been described in many different ways, but in essence, it consists of solving instructional problems by systematically analysing the conditions of learning and designing a satisfying learning experience based on this analysis. Therefore, instructional design refers to the systematic process of translating principles of learning and instruction into plans or specifications for instructional materials or activities. These plans are based on principles that have been successful in the past, namely learning theories. Instructional designers design learning materials that are functional as well as attractive or appealing to the users of the product.

Instructional planning is defined as the development of a sequence of steps, events, or activities that lead the teacher to the achievement of desired objectives. It is also a blueprint of classroom activities involving a sequence of events to be carried with a specific group of students for a given period. It entails the level of preparedness as well as the effort teachers make in gathering information, materials, and strategies for a lesson (Karngbeae and Kennedy, 2022). Instructional planning is the systematic selection of educational goals and objectives, and their design for use in the classroom. Instructional planning is preparation for teaching and learning, including construction of goals, objectives, and instructional and assessment methodology Andreea (2022) argued that effective instructional planning is a key to motivating students' academic growth.

On the other hand, instructional integration refers to the process of blending various teaching methods, tools, and technologies into the curriculum to enhance student learning. It involves incorporating different types of instructional resources, such as digital tools, multimedia, collaborative activities, and real-world applications, into traditional teaching strategies to create a more dynamic and engaging learning environment. The integration of AI driven instruction tools has deepened and enhance active engagement, participation in groups, frequent interaction and feedback, and connection to real-world experience.

Theoretical Framework

The study is based on the Technological Pedagogical Content Knowledge (TPACK) theory that was developed by Mishra and Koehler (2006). The theory assumes that a competent teacher possesses not only pedagogical knowledge (general teaching strategies) and content knowledge

(knowledge of the subject area), pedagogical content knowledge but also technological content knowledge.

According to the theory, technological pedagogical knowledge is the knowledge of the existence, components, and capabilities of various technologies for use in teaching and learning settings and pedagogical considerations for their selection, e.g., whether e-mail, a discussion forum, or a wiki would be an appropriate means for supporting student collaboration in a specific context. Mishra and Koehler (2006) argued that teachers possessing TPACK can effectively use technology to teach content in a pedagogically sound way. They understand how technology can enhance their teaching strategies and how content can be transformed through digital tools, resulting in improved learning outcomes. TPACK requires a deep understanding of how to align technology with both content and pedagogy to create a cohesive and effective learning experience.

The implication of the Technological Pedagogical Content Knowledge (TPACK) theory to this study hinge on the fact that it accentuates the need for teachers to possess all-inclusive knowledge that encourages educators to go beyond merely using technology in the classroom. It advocates for integrating technology in a way that aligns with the subject matter and pedagogical goals. It further implies that there is need for continuous learning and reflection, as the technology landscape and instructional needs of students evolve every day. The TPACK model underscores that technology should not be treated as an isolated aspect of teaching but should be harmonized with content knowledge and pedagogy to create an enriched educational experience.

Thus, when teachers or instructors possess technology, pedagogy and contents knowledges, they can effectively utilize AI tools to enhance content development and delivery, creation of personalized teaching experiences and adaption of innovative pedagogical approaches. Furthermore, AI-powered tools could be used to transform traditional teaching methods into more engaging, interactive, and student-centered learning experiences, creating environments where AI not only supports but also improves learning outcomes.

AI Tools and Instructional Design

The revolution in smart technologies have opened doors to innovative approaches in education, (Choi, Kim, Lee and Moon, 2024) implying that traditional approach of instructional design could be boosted by AI powered automated processes. Studies (Hamilton and Owens, 2018 Choi, et al, 2024) have acknowledged the transformative potential of automation in instructional design. Specifically, Choi, et al, (2024) argued that AI powered automated process signified harmonious interaction between human cognitive processes and the power of computational capabilities. In the field of instructional design and technology, the systematic integration of advanced technologies like AI has the potential to improve the efficiency and adaptability of learning experiences (Choi, et al, 2024). It is expected that combining human pedagogical expertise with analytical capabilities of computational techniques could offer a tailored approach to meet learners' diverse needs (Hamilton and Owens, 2018).

The intersection of human expertise and artificial intelligence (AI) has guided a paradigm shift in instructional design (ID) (Tlili et al., 2023). The recent advancement of AI, exemplified by

tools like ChatGPT (OpenAI, 2023), has paved the way for a new paradigm in instructional design research and practices. ChatGPT, renowned for its advanced language processing and transformation capabilities, has attracted attention across various domains. Preliminary reviews have suggested that ChatGPT can dynamically generate content and provide personalized learning experiences with reciprocal interactions (Lee, 2023). More specifically, the capabilities of large language models (LLMs) with ChatGPT service, have revolutionized the dynamic content creation process, making it faster and more resource-efficient. The efficiency in design performance aids in the swift development of instructional design components. In this regard, Choi, et al, (2024) argued that the role of instructional designers is being transformed with the emergence of AI. Instead of building courses from scratch, they can collaborate with AI in a synergistic way to enhance content design, instructional strategy delivery, and assessment processes. This collaboration seeks to harness the capabilities of AI to enhance instructional design outcomes.

Commenting on the impact of AI on instructional design among university lecturers, Odunaya (2023) submitted that artificial intelligence has emerged as a significant ally in instructional development in tertiary institutions in Nigeria. Ogunode *et al.* (2021) averred that AI contributes to the creation of "smart content," encompassing digital textbooks, guides, instructional snippets, videos, and customized environments tailored to educational objectives. This aligns with the global trend of personalization in education, where AI tools facilitate the development of augmented reality/virtual reality (AR/VR)-based learning environments and web-based lessons. Furthermore, AI Monitoring and Evaluation tools play a pivotal role in streamlining content to accommodate diverse learning styles and pace variations, identifying areas for improvement in the curriculum. Lecture presentation, a crucial aspect of curriculum implementation, is enhanced by AI in tertiary institutions. The quality of teaching contents and methods has been improved, adapting to the needs and capabilities of colleges and universities (Ohiare et al., 2021).

AI contributes to the establishment of an artificial intelligence literacy framework within the general education system, fostering students' general interest, sustainable development, and global governance. By analyzing students' learning styles and abilities, AI facilitates the creation of personalized learning experiences, allowing educators to customize teaching methods, curricula, and materials to meet individual needs. Furthermore, AI automates the assessment and grading process, saving time and ensuring objective evaluation (Oztok and Zingaro, 2019). Large datasets of student information, including assessment scores and behavioral patterns, can be analyzed by AI to identify areas where students may be struggling, enabling targeted interventions (Singh and Singh, 2021). Additionally, the marking of students' scripts is streamlined through AI-powered grading software, combining machine learning to replicate the human grading process efficiently (Smith, 2021).

These tools integrate seamlessly into virtual environments or cloud-based platforms, offering swift and accurate grading, particularly beneficial when handling a substantial number of papers. Lecturers can leverage AI to assign assignments to students online, fostering student involvement in the curriculum. Smith (2022) underscores the capability of AI in assisting lecturers

and teachers with the assignment process, facilitating the issuance and submission of online assignments by students. The technology aids administrators and teachers in analyzing extensive datasets, encompassing student performance data, attendance records, and resource allocation (Westagilelabs, 2022). AI-powered systems discern patterns and trends, providing valuable insights for informed decision-making. This empowers administrators to formulate data-driven strategies for improving student outcomes, allocating resources efficiently, and evaluating programs.

The selection of an appropriate teaching method, a pivotal responsibility of lecturers, is streamlined with AI assistance. With Intelligent auxiliary teaching systems, teachers can collect and analyze data, match learning styles, and establish effective communication with students. This innovation aids in designing teaching plans, collecting materials, online question answering, testing, and evaluating teaching, thereby reducing daily work burdens and introducing new teaching methods to foster students' innovative thinking and social skills (Westagilelabs, 2022). AI can also help teachers to remotely monitor students' learning trajectories, deliver personalized learning resources, and provide real-time guidance through intelligent teaching platforms. These platforms facilitate interactive sessions between teachers and students, allowing personalized learning guidance based on data analysis of students' classroom learning.

Although, there a wide range of literature on AI and instructional design and development, these literatures have not fully established the role of AI in helping teachers in training develop and design instructions. Therefore, this study attempts to examine Artificial Intelligence (AI) and instructional design: Evaluating the influence of AI integration on instructional planning and delivery among teachers in training in University of Uyo.

Purpose of the Study

The main purpose of the study is to examine Artificial Intelligence (AI) and instructional design: Evaluating the role of AI in instructional planning among teachers in training in the University of Uyo. Specifically, the study examines:

i) The influence of AI integration in instructional planning among teachers in training in University of Uyo
ii) The influence of AI integration in instructional delivery among teachers in training in University of Uyo

Research Questions

Three research questions guided the study

i) What is the influence of AI integration in instructional planning among teachers in training in University of Uyo?
ii) What is the influence of AI integration in instructional delivery among teachers in training in University of Uyo?

Hypotheses

The following research hypotheses are formulated to guide the study

i) There is no significant influence of AI integration in instructional planning among teachers in training in University of Uyo
ii) There is no significant influence of AI integration in instructional delivery among teachers in training in University of Uyo

Methods

The survey research design was adopted for this study. The population consisted of all 1358 level 400 students in the faculty of education, University of Uyo, (Students Affairs Department) from which a sample size of 250 participants representing 18.4 percent of the population size. Mean is used to answer the research questions while related t-test was used for testing the hypotheses at .05 level of significance.

Results

Research Question 1

What is the influence of AI integration in instructional planning among teachers in training in University of Uyo?

Hypothesis One

There is no significant the influence of AI integration in instructional planning among teachers in training in University of Uyo

Table 1: Mean and t-test analysis of influence of AI integration in instructional planning among teachers in training in University of Uyo

Variable	N	$\bar{X}$	Weighted $\bar{X}$	Df	t-cal	p-value	decision
AI	250	10.14	2.87	249	254.76	.009	**Sig**
Instructional planning		26.76	3.56				

The result in Table 1 revealed that the mean for the influence of AI on instructional planning. The result indicated that a mean score of 26.76 and weighted mean score of 3.56 for instructional planning this implies that AI integration has a much influence on instructional planning among teachers in training in University of Uyo. Furthermore, the table also revealed that the p-value of .009 is less than .05 level of significance hence, the null hypothesis is rejected. This means that there is a significant influence of AI integration in instructional planning among teachers in training in University of Uyo.

Research Question 2

What is the influence of AI integration in instructional delivery among teachers in training in University of Uyo?

Hypothesis 2

There is no significant the influence of AI integration in instructional delivery among teachers in training in University of Uyo

Table 2: Mean and t-test analysis of influence of AI integration in instructional delivery among teachers in training in University of Uyo

Variable	N	$\bar{X}$	Weighted $\bar{X}$	Df	t-cal	p-value	Decision
AI	250	10.14	2.87	249	215.76	.012	**Sig**
Instructional delivery		25.32	3.19				

The result in Table 2 revealed that the mean for the influence of AI on instructional delivery. The result indicated that a mean score of 25.52 and weighted mean score of 3.19 for instructional delivery this implies that there is much influence of AI integration in instructional delivery among teachers in training in University of Uyo. Furthermore, the table also revealed that the p-value of .012 is less than .05 level of significance hence, the null hypothesis is rejected. This means that there significant the influence of AI integration in instructional delivery among teachers in training in University of Uyo.

Discussion of Findings

The findings of the findings revealed that AI integration has a much influence on instructional planning among teachers in training in University of Uyo. It also revealed that there is a significant influence of AI integration on instructional planning among teachers in training in University of Uyo. This may be due to the fact that teachers in training have considered AI powered tools as generative assistant that could give them ideas on effective instructional planning. This finding aligns with Odunaya (2023) who found that artificial intelligence has emerged as a significant ally in instructional development in tertiary institutions in Nigeria. Similarly, Ogunode *et al.* (2021) found that AI contributes to the creation of "smart content," encompassing digital textbooks, guides, instructional snippets, videos, and customized environments tailored to educational objectives.

The findings of the findings revealed that AI integration has a much influence on instructional delivery among teachers in training in University of Uyo. It also revealed that there is a significant influence of AI integration on instructional delivery among teachers in training in University of Uyo. This finding may be due to the fact that teachers in training believe AI powered tools serve as assistant that could facilitate seamless instructional delivery. This finding is in agreement with that of Westagilelabs (2022) who found that with Intelligent auxiliary teaching systems, teachers can collect and analyze data, match learning styles, and establish effective

communication with students. This innovation aids in designing teaching plans, collecting materials, online question answering, testing, and evaluating teaching, thereby reducing daily work burdens and introducing new teaching methods to foster students' innovative thinking and social skills.

Conclusion and Recommendations

It was concluded that AI integration significantly influence instructional planning and delivery among teachers in training in university of Uyo. Based on the findings of the study, it was recommended that:

i) The Nigerian university commission and University management should implement fully AI integration into teachers training programmes in order to equip teachers in training with AI literacy skills.

ii) There is need to address the ethical issues that may arise as the result of AI integration in instructional design practices.

References

Andreea, E. A. (2022). Instructional design in education. Proceedings of ADVED 2022- 8th International Conference on Advances in Education, Istanbul, Turkey 10-12 October 2022

Choi, G. W., Kim, S. H., Lee, D. and Moon, J. (2024). Utilizing Generative AI for Instructional Design: Exploring Strengths, Weaknesses, Opportunities, and Threats. *TechTrends*, 68:832–844

Ekanem, S. A. (2019). Information and communication technology and students learning behaviour in public secondary schools in Uyo Local Government Area. *Journal of Social and Educational Research*, 2(3), 36-41

Karngbeae, L. D. and Kennedy, G. M (2022). Instructional planning: its importance and basic components. *International Journal of Social Science and Education Research Studies*, 2(12), 802-810

Lee, H. (2023). The rise of ChatGPT: Exploring its potential in medical education. Anatomical Sciences Education, 00, 1–6. https://doi. org/10.1002/ase.2270

Mircea Mureșan, M. (2023). Impact of Artificial Intelligence on Education. RAIS Conference Proceedings, June 8-9, Pp. 81-86

Mishra, P., and Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teachers' knowledge. Teachers College Record, 108(6), 1017–1054

Odunaya M. O. (2023). Impact of artificial intelligence in curriculum development in Nigerian Tertiary Education. *International Journal of Educational Research*, 12(2), 192-211

Ogunode N. J., and Adamu, D. G. (2021). Implementation of sociology programme in nigerian public universities: problems and solutions. *Central Asian Journal of Innovations On Tourism Management and Finance*, 2(4); 33-40.

Ohiare, U. M. F, Ogunode, N. J., and Sarafadeen. R. O. (2021). Implementation of curriculum programme in Nigerian higher institutions: problems and the way forward. *Academicia Globe: Index Science Research,* 2(6); 185-195

Oztok M. and D. Zingaro. (2019). Artificial intelligence in education. Springer.

Singh, V., and Singh, A. (2021). Role of artificial intelligence in educational management. *Journal of Education and Practice*, 12(12), 78-85.

Smith, J. (2021). Applications of AI in Educational Management. *International Journal of Educational Technology in Higher Education*, 1 8(1), 1-17

Smith, J. (2022). Applications of artificial intelligence in educational management. *Educational Technology Research and Development*, 70(2), 457-478.

The University of San Diego (2023). Instructional design: An overview. Retrieved on the 7th September, 2024 from https://onlinedegrees.sandiego.edu/what-is-instructional-design-examples/#:~:text=A%3A%20Instructional%20design%20is%20%E2%80%9Cthe,tutorials%2C%20learning%20simulations%2

Tlili, A., Shehata, B., Adarkwah, M. A., Bozkurt, A., Hickey, D. T., Huang, R., and Agyemang, B. (2023). What if the devil is my guardian angel: ChatGPT as a case study of using chatbots in education. Smart Learning Environments, 10(1), 15.

United Nation Children Fund (UNICEF, 2021). Policy guidance on AI for children. Retrieved on the 7th September 2024 fromhttps://www.unicef.org/globalinsight/media/2356/file/UNICEF-Global-Insight-policy-guidance-AI-children.

Westagilelabs, (2022). How Artificial Intelligence (AI). is transforming education: 8 cutting-edge applications. Retrieved on the 7th September 2024 from https://www.westagilelabs.com/blog/8-applications-of-artificial-intelligence-ineducation/.

Yadrovskaia, M. Porksheyan, M. Petrova, A, Dudukalova, D. and Bulygin, Y. (2023). About the attitude towards artificial intelligence technologies. E3S Web of Conferences. Retrieved on the 7th September 2024 from https://doi.org/10.1051/e3sconf/202337605025