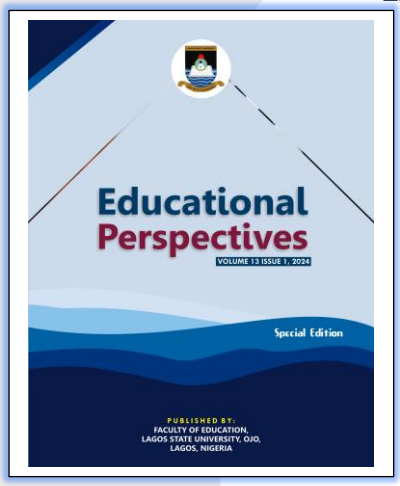

Utilisation of Artificial Intelligence intervention on Academic performance of undergraduates in tertiary institution, Lagos State

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ABSTRACT

With the intervention of Artificial Intelligence in the educational clime, the sector has witnessed changes in the mode of instruction by teachers, quality of assignments carried out by students, quality of paper writing and presentation, improved research outcome among others. In other to expand on its positives, two research hypotheses were formulated to direct the focus of this work. Quasi experimental research design was used for this work as participants cannot be manipulated. With population of undergraduates in Lagos State Tertiary institutions, the target population was year three students in LASUED, Epe campus and LASU, Ojo, Lagos. Through purposive and simple random sampling techniques, a sample of 60 undergraduates from Educational Management department was selected for this work. A self-structured instrument titled, "Utilisation of Artificial Intelligence Intervention on Academic performance of Undergraduates in Tertiary Institution (UAIIAPUTIQ), Achievement Test on Educational Management and a treatment package was used to generate data. This Questionnaire contained 20 items as respondent were conditioned to the use of 4-likert form of strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD). Content validity was ensured by three experts in Educational Planners from Department of Educational Management, University of Lagos, Akoka. Test-retest form of reliability was carried out on 30 students not captured for this study and co-efficient value of 0.781 was obtained showing that the items in the instrument are suitable for the study. Data was analysed through ANCOVA and tested at 0.05 significant level. The study revealed that the intervention of Artificial Intelligence has brought relieve for students in many ways through its aid in task simplification, ensure in-depth understanding through sourcing of academic contents online. The study concluded that the intervention of artificial intelligence has further promoted indiscipline and high level of unseriousness among many undergraduates.

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Introduction

Artificial Intelligence (AI) was established as an academic discipline in the 1950s wherein it was described as a systemic ability to interpret, learn, and achieve specific tasks from data. It was classified as "analytical, human-inspired intelligence" because of the features it contains, together with the exhibited outputs that involve cognitive, emotional, and social display. In recent developments and advancements, several platforms have popularized mainstream usage of AI as part of daily processes such as incorporation of AI in tools that are used in several industries. This has implicated the inclusion of AI systems in day-to-day usage, indicating the improved outcomes of using AI as a powerful tool to increase efficiency and quality.

Zhang & Lu (2021) described AI as a knowledge project that absorbs various information, analyzes these data, and studies the methods of expressing the outcomes. It compiles multi-disciplinary information, processes it according to categories, and displays based on commands. It was noted as a revolutionary technology that results in efficient labor improvements, cost reduction, and optimization of human resources toward job opportunities creation. Nabila et al. (2021) explained that this "man-made brain power" has induced advances that have been subjects in academic, public, and business arrangements, promoting proficiency and efficiency in the development of processes and mechanisms. It has tapped into several societal spheres such as marketing, healthcare, and human rights (Perifanis & Kitsios, 2023).

Furthermore, Emmert-Streib (2021) discussed that technological progress, such as AI, has led to powerful mechanisms and technologies that have barged through the intricacies of several areas of knowledge including science, industries, and daily lives. This has placed a significant increase in digital traces of data that has welcomed both opportunities and challenges in the adoption of the technologies. Considered a digital revolution, these developments are subject to the scrutiny of responsible usage of these advancements, as well as the generated data from its processes. Emmert-Streib also emphasized that these advanced learning paradigms put forward the necessity to facilitate general approaches to maximize usage while maintaining ethical and appropriate use.

In recent years, artificial intelligence (AI) technologies have been increasingly utilized in education in a variety of ways including personalized learning, administrative task automation, and even tutoring and mentoring. These tools can assist educators in analyzing pupil performance data, providing feedback, and providing individualized instruction. In addition, virtual assistants and chatbots powered by AI are used to provide personalized support, answer queries, and assist with administrative tasks for students. A large quantity of data and computational techniques are used to make predictions regarding the meaningful combination of words. Similarly, in November 2022, the artificial intelligence company 'Open AI' published a new viral bot called 'ChatGPT'. This bot has attracted millions of users and investors, and scientists believe that it will eventually supersede humans. Open AI devised a user interface to enable direct public experimentation as a revolutionary step (Chew & Cerbin, 2021).

In the end of 2022, ChatGPT application released by OpenAI company to the public and millions of people started using in the first month because of its unprecedent level of intelligence and complexity in addition to part of the community claiming it will be the new Google search engine (Abdullah, Madain & Jararweh, 2022). Educators were amazed by the exceptional abilities of ChatGPT to do in the education field (Alam & Mohanty, 2023). ChatGPT is a generative AI model and generative AI is a type of machine learning algorithms that could learn from content such as audio, image, and text to generate new content (Anis, 2023). So Generative AI models

generate artifacts as an output, for example ChatGPT can generate output as a human-like language. There are other generative AI models which focused on specific domain like software engineering, such code auto-completion, convert natural language to code, and translate code from a specific programming language to another one (Anis, 2023). Due to the ability of ChatGPT in generating human-like language and answering many questions in a logical manner even if these questions asking to prepare an assignment, quiz questions or any other academic task. Many academics started using ChatGPT and found it useful to save their time in teaching, assessment and research, so they can spend more time with students on other important activities (Alam & Mohanty, 2023). Artificial intelligence (AI) has been extensively incorporated into a number of educational technology systems, including Virtual Mentor, Voice Assistants, like Google Assistant, Siri (Apple), and Cortana (Microsoft), Smart Content generator, Presentation Translator, International courses including MOOCs, Udemy, Google AI, Alison, Khan Academy, edX, Udacity, Coursera, Automatic assessment, personalized learning, using Ruangguru, Games for learning, Intelligent Tutoring Systems (ITS), or Intelligent Computer-Aided Instruction (ICAI) among others. The technique of simulating human thought processes and creating machines that behave like people is known as artificial intelligence (AI) (Babitha, Sushma & Gudivada, 2022). Due to the crucial role that ChatGPT can play in education, one of the professors at University of Rhode located in South Africa, wrote an extensive guide (A Guide to Conversational AI) about using ChatGPT in higher education and what are the best practice for students and educators (Bin & Mandal, 2019).

According to the mentioned guide, ChatGPT can be used in any domain, including research papers, presentations, and online material. Additionally, educators and students should be prepared for the social consequences of AI use, including ChatGPT, as well as any potential effects on job displacement and other social issues. Students and teachers must comprehend ChatGPT's and other AI tools capabilities and limitations, work together to share best practices, integrate those tools into pertinent courses, routinely evaluate the effectiveness of their use, and continue to investigate the technology's potential in projects, research, and industry.

Academic performance describes academic outcomes that indicate the extent to which a student has achieved their learning goals. Academic performance can also refer to completing educational benchmarks such as a degree. Performance is often measured through examination or continuous assessment. It can also be defined as the extent to which a student or institution has achieved short- or long-term educational goals. Performance may be measured through students' grade point, whereas for institutions, Performance may be measured through graduation rates. Ubanga (2013) defined Academic performance as the scores generated from a testing condition. To him Performance is a function of cognitive functioning. Scores generated from a test gives the real acquisition level of an individual learner. Students in a testing condition tend to regurgitate a certain quantity of information when exposed to test; Meanwhile Ogunjimi (2018) sees Academic performance as the generic performance of testees towards a cognitive tool. To him cognitive tools like test, continuous assessment, raw scores are all designed to determine the extent to which certain content are been mastered by the learners. Meanwhile, Ilogu (2016) perceive Academic performance as the degree to which a test taker generates test score from a testing instrument. In his words, students' Performance is determined by the extent of effective drawing of items using table of specification. The foundation for test development is test blueprint as it remains the only framework that guides a test developer in the course of

designing a test. It should be noted that there is no general agreement on how it is best evaluated, or which aspects are most important like procedural knowledge such as skills or declarative knowledge such as fact.

Meanwhile Israel et al (2024) noted that the use of AI apps goes a long way to improve on the academic performance of tertiary institution students notable among those positives includes:

i. Essay Grading Automation: ChatGPT can be taught to grade student essays, allowing instructors more time to focus on other aspects of instruction. Kim and colleagues demonstrated that a generative model (ChatGPT) trained on a dataset of human-graded essays could accurately grade high school student essays with a correlation of 0.86 with human grades. The study demonstrated that the model could identify key characteristics of well-written essays and provide feedback comparable to that of human evaluators.
ii. Translation: ChatGPT can be used to translate educational materials into multiple languages, making them accessible to a larger audience. Dwivedi, et al (2021) demonstrated that a generative model (ChatGPT) trained on a dataset of bilingual sentence pairs could translate accurately between languages, attaining state-of-the-art results on several translation benchmarks. The research demonstrated that the model could comprehend the meaning of sentences in one language and produce accurate translations in another.
iii. Interactive Learning: ChatGPT can be used to construct interactive learning environments in which students can converse with a virtual tutor who can answer students' queries and explain a variety of topics. This can be especially beneficial for students who are struggling with a particular topic or who require additional assistance outside of the classroom. In addition, research indicates that non-native speakers of national languages and students with learning and language disabilities (writing difficulties) will benefit the most from these natural language models.
iv. Adaptive Learning: ChatGPT can be used to construct adaptive learning systems that modify their teaching methods based on a student's performance and progress. A study [6] demonstrated that an adaptive learning system based on a generative model (ChatGPT) could provide more effective support for students learning programming, resulting in enhanced programming assessment performance. The study demonstrated that the model could comprehend students' knowledge and adjust the level of difficulty of the problems it generated accordingly.

Its demerits cannot be over-emphasised in tertiary institutions since students and teachers are known to fraternise with its use. Among them are:

i. Lack of Understanding: The inability of generative models to comprehend context and circumstance can result in inappropriate or irrelevant responses. A study by Ibrahim (2023) confirmed that a generative model-based tutoring system was incapable of providing explanations that were tailored to students' misconceptions.
ii. Absence of human contact: Students who interacted with a virtual tutor that exhibited human-like affective behaviour had a superior learning outcome than those who interacted with a virtual tutor that lacked this behaviour, according to a study by D'Mello and Kaplan-Rakowski, et al (2023).
iii. Data Dependent: A study demonstrated that a generative model-based question-

answering system performed poorly when the training data was irrelevant to the task at hand. On the other hand, failures in basic tasks have also been widely shared.

iv. Bias in Training Data: A generative model trained on a large corpus of internet-sourced text displayed gender bias in its language generation. ChatGPT has a problem with hallucinations.
It generates more extrinsic hallucinations statements that cannot be independently verified from the source - from its parametric memory across all tasks, as it lacks access to external knowledge bases. Insufficient capacity to personalize instruction: ChatGPT and other generative AI models can provide general information and assistance, but they may be unable to personalize instruction to meet the specific requirements of each student.

v. Privacy and Security: There are also privacy and data security concerns regarding the use of ChatGPT and other generative AI models in education.

Despite the above demerit of the app, it still comes with immeasurable positives since its introduction has really contributed significantly to student academic performance. According to Israel and Rahmat (2024) they stated that with the use of ChatGPT, students tend to develop critical thinking skills devoid of fallacies as they are taught how to fine-tune and construct concepts in a manner that shows dexterity. This AI device also contributes positively towards the development of students' self-independence and rational decision-making process. They claimed that exposure of students to this AI tool would further promote self-confidence and improvisation which would be directed towards improvement in academic performance of students especially in Human Resource Management.

Meanwhile on perception of students towards the app, from observation it can be deduced that students who have been exposed to the use of this app, tend to have a different and positive perception towards the use of the AI tool. The perception of students towards the package would have a positive impact on students' performance. Studies by Adeyemi (2012) and Ngo (2023) identified that due to frequent use of this app, students tend to develop a positive attitude towards the package. They claimed that students' perception towards the use of the AI device is positively significant to their academic performance as assignment, term papers, presentations, research work among others has been made simple by the app. They stated that students are familiar with the use of other devices but that of ChatGPT is specifically tied to academics due to its configuration. It is user friendly as a result allows for positive relationship to be established. Their perception on the use of these apps is one that is targeted at improvement of human behaviours and performance. They are of the view that the use of the device aid reduces burden of over thinking and excessive workloads.

In general, the development of AI tools has expanded educational opportunities and made it simple for educators to provide students with personalized and effective learning experiences. As artificial intelligence (AI) technology continues to advance, we can anticipate even more innovations in education and other areas of society.

Statement of the problem

The advent of artificial intelligence is really an addition to the field of education, but its shortcomings cannot be underemphasised out-rightly. In tertiary institutions, the performance of students is gradually dropping due to students' involvement in academic related activities. Stakeholders have argued that this systemic fall in academic performance may be due to the dynamic nature of the curriculum, teacher method, perception of students and deficiency in the use of IT packages that use machine language among others. With the introduction of AI package like

ChaptGPT, it is believed that attitude and perception of students towards the package would change and ultimately an improvement on their academic performance.

Research Questions

1: What is the mean effect of treatment on undergraduates' academic performance in tertiary institution

2: What is the mean effect of perception on undergraduates' academic performance in tertiary institution

Research hypotheses

$H0_1$: There is no significant mean effect of treatment on undergraduates' academic performance in tertiary institution

HO_2: There is no significant main effect of treatment on perception of undergraduate's academic performance in tertiary institution

Methodology

The study adopted pre-post-test control group Quasi-experimental research design to examine the effect of the treatment (ChatGPT) on undergraduates' academic performance in Economics of Planning

Research Instruments

Economic of Planning Test (EPT)

This instrument was developed by the researcher to measure students' academic performance in EPT. The instrument is made up of two sections A and B. Section A provides information on students' biodata which consist of name of school, level, gender and age while Section B consists of thirty (30) items to test the cognitive level of the students on Economics, one of the compulsory departmental courses to be taken by students at 300 level. Each correct response was accorded one mark to make a total of 30 marks. These items were created with the aid of table of specification on (300 level) Year 3, Educational Management (Specialization in Economics) course outline.

Students Perception of the AI (ChatGPT) Questionnaire (SPAQ)

The learning outcomes of students are strongly related to their perception towards the use of AI by students of Educational Management. In this study the instrument christened student's perception of AI Questionnaire was developed. The instrument has two sections of A which consists of bio-data information of the students while B comprised 15 items with a 4-likert scale ranging from Strongly Agree, Agree, Disagree and Strongly Disagree respectively.

Participants

The purposive sampling technique was used in the selection of schools for the research. The participants were Year 3 students in the department of Educational Management. The choice of these participants was based on their exposure to teaching and learning of Educational Management in Lagos State University, Ojo and Lagos State University of Education, Epe, campus. These students are used to writing assignments, making presentation and term papers from 100 to 300 levels and most of them use technology to achieve this feat. Using purposive sampling method 30 students from LASU were selected as experimental group and another 30 students from LASUED were selected as control group, making a sample of 60 students. This was so in order to eliminate interference by students.

Selection was also based on criteria such as:

i. The tertiary institutions have relative population size of Educational Management students.
ii. They institutions produce some of the best graduates in that field
iii. Their students are grounded with knowledge of Educational Management
iv. Students were willing to participate in the study
v. Students in the department are known to be IT friendly

Procedure

The experiment lasted for four weeks

Week 1: Training was done for the research assistants. The instruments were administered to the students in the experimental and control groups for the pretest exercise.

Week 2-5: The research assistants gave a counselling session to the control group. Then used the ChatGPT AI package to teach 3 sensitive topics in EMT: Budgeting, Human Interpersonal Relationship and Data analysis. These topics were summarised into three pages and taught within the second and fifth weeks.

Week 6: Revision and administration of post-test Questionnaire was done.

Artificial Intelligence Intervention (ChatGPT) Package (AIIP)

ChatGPT is an AI intervention package often use to simplify tasks and complex activities that humans would have been engaged in. This intervention aids in remodelling of concepts, restructuring of solutions, sequential arrangement of facts and figures and simplification of complex human related activities among others. It was also used to summarise the three identified topics in EMT programme contents as put forth nu NUC, (2023).

Data Collection

The researcher constructed Achievement Test and students' perception Questionnaire were administered to the participants and the scores were collated respectively.

Data Analysis

Data collected from the researcher designed achievement test and Questionnaire were subjected to inferential statistics. The data was analysed using Analysis of Covariance (ANCOVA) and tested at significant level of 0.05 respectively.

Result and interpretation

Research Question 1: What is the mean effect of treatment on undergraduates' academic performance in EMT

Table 1: Mean effect of treatment on undergraduates' academic performance in EMT

Mode of test	N	Mean	SD	Gained Mean
Pre-performance	30	2.43	0.673	1.18
Post-performance	30	3.61	0.233	

Results in table 1 show that treatment means scores of undergraduates before and after exposure to the treatment of ChatGPT are 2.43 and 3.61 respectively. The mean difference of 1.18 was gained after treatment administration. Hence using the AI package has a positive effect on the academic performance of undergraduates.

Research Question 2: What is the mean effect of perception on undergraduates' academic performance in EMT

Table 2: Mean effect of perception on undergraduates' academic performance in EMT

Mode of test	N	Mean	SD	Gained Mean
Pre-perception	30	3.12	0.372	0.78
Post-perception	30	3.90	0.557	

Results in table 2 show that mean perception scores of undergraduates before and after exposure to the treatment of ChatGPT are 3.12 and 3.90 respectively. The mean difference in their perception level is 0.78 and this is the owed to the quality of treatment administered. Due to the use of ChatGPT, it gives a positive perception of undergraduates on the academic performance of undergraduates.

Test of hypothesis

$H0_1$: There is no significant mean effect of treatment on undergraduates' academic performance in EMT

Table 2: Mean effect of perception on undergraduates academic performance in EMT

Source	Dependent Variable	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	Performance	1.226[a]	1	1.226	1.719	.005
	Perception	.041[b]	1	.041	.083	.018
Intercept	Performance	22.972	1	22.972	32.217	.000
	Perception	24.301	1	24.301	48.699	.000
Treatment	Performance	1.226	1	1.226	1.719	.003
	Perception	.041	1	.041	.083	.001
Error	Performance	41.357	58	.713		
	Perception	28.942	58	.499		
Total	Performance	743.000	60			
	Perception	563.000	60			
Corrected Total	Performance	42.583	59			
	Perception	28.983	59			

a. R Squared = .961 (Adjusted R Squared = .952)
b. R Squared = .801 (Adjusted R Squared = .819)

Table 3 shows that there is a significant main effect of treatment perception on undergraduates' academic performance in EMT as in $F_{(1,58)} = 1.719$ at $P<0.05$; Hence the null hypothesis is rejected and alternative which states that there is a significant mean effect of treatment on undergraduates' academic performance in EMT is retained.

HO_2: There is no significant main effect of treatment perception on undergraduates' academic performance in EMT

From the same table 3 it shows there is a significant main effect of treatment perception on undergraduates' academic performance in HRM as in $F_{(1, 58)} = 0.083$ at $P<0.05$; Hence the null hypothesis is rejected and alternative which states that there is a significant mean effect of treatment perception on undergraduates' academic performance in EMT is retained.

Discussion of Findings

The study revealed that there is a significant mean effect of treatment on undergraduates' academic performance in Educational Management. It suffices to state that the use of intervention measure contributed to the improvement of academic performance in undergraduates. The outcome of this study conforms to that of Israel and Rahmat (2024) who claimed that with the use of ChatGPT, students tend to develop critical thinking skills devoid of fallacies as they are taught how to fine-tune and construct concepts in a manner that shows dexterity. This AI device also contribute towards students' development of self-independence and rational decision-making process. Israel and Rahmat (2024) also noted that exposure of students to this AI tool further promote self-confidence and improvisation which would be directed towards improvement in academic performance of students especially in Educational Management.

Also, from hypothesis 2 it reveals that there is a significant mean effect of treatment perception on undergraduates' academic performance in EMT. The finding is in consonance with that of Adeyemi (2012) and Ngo (2023) that claimed that students' perception towards the use of the AI device is positively significant to their academic performance. They stated that most students are familiar with the use of other devices but that of ChatGPT is specifically tied to academics. Their perception on the use of these apps is one that is targeted at improvement of human behaviours and performance. They are of the view that the use of the device aid reduces burden of over thinking and excessive workloads. Students' perception towards the intervention of Artificial Intelligence have brought relieve for students in many ways through its aid in task simplification, ensure in-depth understanding through sourcing of academic contents online.

Conclusion

In this work the integration of ChatGPT an artificial intelligence tool was delved into with tertiary institutions in Lagos state. The findings underscore a prevailing positive sentiment towards ChatGPT among students. It emerged as a promising instructional resource, fostering engagement and facilitating learning experiences. However, alongside this optimism, this study uncovered reservations regarding its practical application and accessibility, posing challenges to its widespread adoption.

Recommendations

The following are some of the recommendations made from the findings of the study:

i. The curriculum should be reviewed to formally incorporate ChatGPT into teaching and learning exercise.

ii. New teaching methodologies should be incorporated so that ChatGPT be integrated as a teaching platform.

iii. Teaching staff should be exposed to training periodically as this would aid in knowledge sourcing

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