Artificial Intelligence (AI) and the Teaching of Analytical Concept in Economics among Students in Federal University Lokoja, Kogi State-Nigeria

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Abstract
The design of this study was a survey. Simple random sampling was used to sample from the population. The rating scale was titled, Artificial Intelligence in Teaching Economics Analytics Approach Scale (AAITEAAS)". One shot method of administration was applied to test for reliability on 30 students from Federal University Lokoja. Internal consistency was established on a one-shot method of administration using Cronbach Alpha statistic with an index of 0.84, indicating that the instrument is reliable. The 212 copies of the instrument were administered and retrieved on the spot so as to ensure high percent return rate. Means score and standard deviation was used to answer the research questions while independent sample Z test was used to test the hypothesis at 0.05. The findings revealed that there is no significant difference between the mean ratings of economics teachers and economics students on the importance of artificial intelligence in teaching economics student's analytics concepts.it was recommended that there is need by the education authority to develop and implement policies regarding the application and use of AI, both as a tool for teaching and learning economics analytical concepts, but also for use in administration

Keywords: Artificial Intelligence Economics, Analytics Concept

Introduction

One of the key roles of modern educational system is that it creates competences that allow people to participate in the economic sphere of life. The history of educational systems is closely linked with the development of the industrial society, and wage labour is still a central organizing principle in industrial societies and their everyday life (Trisoni, Ardiani, Herawati, Mudinillah, Maimori, Khairat, David, & Nazliati, 2023). In high level policy discussions, education is therefore often understood as a source of employment. Education, in this interpretation, is a key driver of economic productivity and competitiveness, and educational policies are framed in the context of economic growth using analytical approach. It is therefore important to ask also in the context of application of artificial intelligence (AI) to education how AI will transform teaching and learning. For economists, a central question has been whether analytical approach can be effective with the use of artificial intelligence.

The globalization of technologies has played key roles in improving educational output as well as, a well-informed education society with adequate information at its disposal. The dissemination of Information and Communication Technologies (ICTs) in overall society is yielding different kinds of transformations (Ahamefula, Anum & Megwa). The school environment, as a part of the social system is not beyond these transformations derived from the inclusion of the technologies. In fact, since few years back and from different institution settings, action plans are being set, as a last resort in order to establish the adequate use of these technologies as much in questions of didactic and practical application as in those referred to its deontology; and thus, to adapt to new social requirements. The change that brought about new technologies has a significant effect on the way people live, work, play and transacts business and diffusion of information (Eekoka &Anum, 2018).

Technologies, in one form or another, has always been part of the teaching and learning environment. It is part of the teacher's professional toolbox. In other words, it is among the resources that teachers use to help facilitate student learning. Technology has changed dramatically over recent decades (Mircea, 2023). The increasing variety and accessibility of technology has expanded the toolbox and the opportunities teachers have to use technology for effective teaching (Brown, & Mbati, 2015). Technology such as Artificial Intelligence has become increasingly present in our lives, having a significant impact in various fields, including education. Education has undergone a series of changes and under the impact of artificial intelligence that brings with it the opportunity to transform, to adapt the way the teaching/learning process is carried out. Artificial intelligence refers to the development of systems and machines that can simulate intelligent human behavior, such as learning, reasoning, and problem-solving (Mircea, 2023). Lainjo, and Tmouche, (2023) sees AI can be described as a digital platform analogous to the human mind with the capability of achieving formidable outcomes using complex and sophisticated algorithms to solve complicated problems. Artificial Intelligence involves the use of algorithms, and complex mathematical models to enable machines to learn and improve their analytical approach and to exhibit specific to human intelligence. In line with Zhang, and Chen, (2022); and Chen, (2022) Artificial Intelligence or commonly abbreviated as AI is an application and instructions that are connected to computer programming to be able to do something that in the human view is intelligent or can be understood as a lesson on how to make computers able to do things that are currently done better than humans.

Learning by utilizing the function of AI is personalized learning (learning that adapts to student needs) so that it can improve student learning experiences and make students better understand a subject matter (Jiang, Li, Wang, & Wang, 2021; & Dong, Huang, & Lin, 2021). The application of AI in teaching economics is focused on the

analytical, statistical and methodological approach of the subject area. Economics is a dynamic subject which touches our lives daily. Irrespective of the profession that an individual pursues, he/she is exposed to Economic terms at every step. Ranging from taking decisions on whether to buy a pair of shoes to whether to take a loan to purchase a house, all such decisions are driven by Economic principles (Ezekoka, Isiozor and Anum, 2016). Economics is one of the few social science subjects that heavily utilize statistical and mathematical models to analyze real-life economic problems. Amaechi (2015) defines Economics as a social science that studies human behaviours in his effort to allocate his scarce resources efficiently and effectively in order to minimize cost.

Economics analytical approach is a way of studying and understanding how the economy works using numbers, data and math. This also involves the use of an appropriate process to break down into the elements necessary to solve it. Because this is not done, the problem remains too big and complex to solve. That is one reason an analytical approach is the only reliable way that will work on solving the global economic and environmental sustainability problem, because that problem is too big and complex too solve any other way (Takayama,1993). The application of AI to economic approach could be a global way of solving various economic problems. The foundation and installation of Artificial Intelligence is very broad, including in the field of education. Learning using this AI system is learning that has been modified so that it can improve learning achievement and student focus. Therefore, introducing AI in teaching Economics analytical approach has the ability to complement, reinforce, and to enhance the educational process. It will take the focus of education from the institution to the student academic performance.

Increasing student focus in learning how to solve economic problems using analytical approach is one form of the role of AI in individual systems. This is because the ability possessed by AI is that it can teach students to learn individually by creating the needed analytical skills to take critical decisions on the different economic problems they encounter and be able to recognize the surrounding economic challenge in their environment needed to find the right way of learning for student. The application of artificial intelligence in teaching analytical approach can improve student achievement during the teaching and learning process in the classroom, especially at the senior high school level. For example, if this technology knows what makes us interested in an object, then that object will be used as an example to make it easier to understand the subject matter. Artificial Intelligence can identify what methods make it difficult for students to understand analytical approach (Chassignol, Khoroshavin, Klimova, & Bilyatdinova, 2018). So that later AI can get used to finding new ways to helping teachers teach analytical approach and the student learning to more easily understand the analytical approach concept given by the teacher and students will become more enthusiastic during

the learning process (analytical approach), because if students don't understand the approach to economic analysis, it will make the students more passive.

AI has made it a present-day reality that imitates humans in many functions such as language translation, medical diagnostics, and decision making. If humans interact, analyze, deduce, think logically, and reason contextually, AI performs these actions artificially based on powerful computers, high-speed internet connections, algorithms and extensive real-time data (Chin, 2018). Unlike humans' AI performs fixed and domain-specific tasks with unmatched learning speed, extensive data, excellent efficiency and unlimited computing capacity. On the contrary, humans learn flexibly, pose, and solve issues creatively, think critically, and innovate adaptively (Chin, 2018). Despite the above facts about humans, AI, deep learning, and ample data supply, AI has surpassed average human performance in manufacturing analytical and face recognition (Zouhaier, 2022).

Artificial Intelligence has several important roles in teaching economics analytical concepts: 1) Virtual Mentor, this can provide or assist students in finding material and answering practice questions, for example Blackboard. 2) Voice Assistant, allows students to search for various study materials, reference questions, articles or books just by providing keywords. 3) Smart Content, an example of the technology is Cram101 which functions to make a book into a more specific summary as needed. 4) Presentation Translator, the same as Voice Assistant, only this Presentation Translator can explain a text into the de552 sired language. (Trisoni *et al*.,2023) 5) Global Courses, with this students can search for or take courses online from all over the world. 6) Automatic Assessment, using this can make it easier for teachers to prepare and hold quizzes easily and practically) Personalized Learning, allows students to get services like a personal assistant.

Privacy and security concerns are also important considerations. The collection and storage of student data by AI tools can raise privacy issues and increase the risk of data breaches or cyber-attacks (Ching *et al*., 2018; Schaub *et al*., 2018). Protecting students' privacy and ensuring the security of their information should be a priority when implementing AI tools and devices. The existence of AI can reduce students' interest in reading economics textbooks, AI replaces the role of economics teachers as student educators, economics teacher's inability to use appropriate AI software's, economics student's inability to effectively utilize AI tools, the application of AI reduces the economics teachers teaching efficiency. In order to mitigate the negative effects of AI tools and devices, ethical considerations should be incorporated into their design and use. Transparency, accountability, and fairness should guide the implementation of AI in education (OECD, 2019). Educators and policymakers should provide guidelines and training on the responsible use of AI tools to minimize potential negative effects and maximize their benefits for students

Theoretically, this study is anchored on Automation theory in clinical chemistry in 1930. The use was made of simple instruments based on classical principles of analytical chemistry. Instrumental analysis became more important because of a switch to physical and physicochemical measurement approaches. Mechanization and automation of most of the functional components of analytical systems has allowed clinical chemistry to grow and develop into a systems approach in which all aspects of clinical determinations have become integrated. Software, that was originally used primarily to sequence the mechanical processes and process raw measurement data, has become so sophisticated and generally available that it can now be used to monitor and control processes and to interpret information. This development has made it possible to incorporate intelligence into advanced analytical instrumentation. This form of machine intelligence is also called Artificial Intelligence (AI). AI is being used increasingly in the clinical laboratory, both in the form of stand-alone expert systems for clinical decision making and as knowledge-based systems embedded within laboratory instrumentation. In addition to AI systems that can be implemented in standard computers, progress is being made in the development of software architectures that mimic human intelligence. Empirically, the study of Trisoni, *et al*, (2023) revealed that Artificial Intelligence is a factor that cannot be ignored in a quality learning process. From the data obtained, it can be concluded as follows: it illustrates that the responses were based on 81 people, both students and teachers, who were examiners and assessors in this research. Based on the results of respondents seen in the table above, many agree that AI can find errors in a learning method, getting the highest percentage of (67.9%) which is included in the agree criteria. They are of the opinion that with help from AI they can find out problems if applied to teaching. The study further revealed that AI which can help students find answers to analytical assignments given by the teacher, obtained a percentage of 65.4% which is also included in the agree criteria. Zouhaier, (2022) study revealed that AI will significantly impact higher education in many areas, such as learning and teaching methods, assessing and grading, analytical skills required for future work, and future graduate careers.

Economics Analytical approach has been a serious concern in the course of study due to its high utilization of analytical and statistical methodological approach, this has affected student's choice of studying the course. Going by opinion of United Nations (2018) the twenty-first century has posed many challenges to the new world order. The application of artificial intelligence in teaching students' analytics approach in economics are two crucial areas, among many others, worth studying. Therefore, researchers here try to review the importance of the application of Artificial Intelligence in teaching students' analytics approach in economics. Can using AI at the tertiary institutions level improve student analytics concepts?

Purpose of the Study

The main purpose of this study is to examine artificial intelligence in teaching students analytics approach in economics. Specifically, the study sought

1. Ascertain the importance of artificial intelligence in teaching economics analytics concept to students.
2. Determine the challenges of using artificial intelligence in the teaching of economics analytics concepts

Research Questions

The following research questions were formulated by the researcher in line with the purpose to guide the study

1. What are the importance of artificial intelligence in teaching economics student's analytics concepts?
2. What are the challenges of using artificial intelligence in the teaching of economics analytics concepts?

Null Hypotheses

The following hypotheses are tested at 0.05 level of significance

1. There is no significant difference in the response of lecturers' and students' response on the importance of artificial intelligence in teaching economics analytics concept to students
2. There is no significant difference in the response of lecturers' and students' response on the challenges of using artificial intelligence in the teaching of economics analytics concepts.

Methodology

The design of this study was a survey. The population of the study was made up of 578 economics students and economics lecturers in Prince Abubakar Audu University, Ayingba. Simple random sampling technique was used to sample 176 students and 36 lecturers for the study. The researchers utilized a self-constructed ordinal rating scale as the research instrument for the collection of data. The rating scale was titled, "Application of Artificial Intelligence in Teaching Economics Analytics Approach Scale (AAITEAAS)". This instrument for the study had 30 items using the four-point scale of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) weighed 4, 3, 2, and 1 point(s) respectively. The face validity of the instrument used was carried out by three specialists from the field of Educational Measurement and Evaluation and two specialists from Educational Technology that looked at the instrument and made necessary corrections and constructive criticisms which were useful for the preparation of the final draft of the instrument. One shot method of administration was applied to test for reliability on 30 students from Federal University Lokoja. With this, the items in the

instrument were collated and scored. Internal consistency was established on a one shot method of administration using Cronbach alpha statistic with an index of 0.84, indicating that the instrument is reliable. The 116 copies of the instrument were administered and retrieved on the spot so as to ensure high percent return rate. Pearson product moment coefficient correlation was used to answer the research questions while independent sample Z test was used to test the hypothesis at 0.05 degree of freedom.

Results

Research Question 1: What is the importance of artificial intelligence in teaching economics student's analytics concepts?

Table 1: Importance of artificial intelligence in teaching economics student's analytics concepts

S/N	Item Statement	Lecturers' n=36			Students' n=176		
		$\bar{X}$	SD	Decision	$\bar{X}$	SD	Decision
1	direction of student interest towards statistical method	3.00	1.15	Agree	2.56	1.12	Agree
2	AI makes students interested in mathematical concepts	3.14	1.18	Agree	2.76	1.07	Agree
3	AI can look for best way teach advance mathematics of economics	3.22	.86	Agree	3.12	.90	Agree
4	AI helps students improve their individual analytical skills	3.08	1.11	Agree	3.11	1.13	Agree
5	The use of AI helps in immediate feedback by the students when faced with statistical problem	2.81	1.41	Agree	2.51	1.33	Agree
6	AI makes it easier for students to understand analytical conception in economics	2.83	1.29	Agree	2.74	1.28	Agree
7	With AI, it can identify behind students' lack of understanding in statistical approach in economics	3.00	1.25	Agree	2.99	1.22	Agree
8	AI helps students obtain answers to high analytical methods assignments given by teachers	3.00	1.17	Agree	2.94	1.15	Agree
9	AI makes it easier for students to find analytical study contents with easy learning approach	3.14	1.07	Agree	3.13	1.07	Agree
10	Using AI can increase student productivity in econometrics	2.97	1.05	Agree	3.05	1.16	Agree

11	AI can minimize student errors in advance economics theory	3.25	.81	Agree	3.28	.94	Agree
12	AI can increase student creativity in handling economic theory concepts	3.00	1.10	Agree	3.02	1.10	Agree
13	AI's way of linking what students like with the subject matter makes students understand more and are enthusiastic about analytical concepts in economics	3.00	1.19	Agree	2.94	1.22	Agree
	Mean of Means	**39.44 3.03**	**14.64 1.12**		**38.15 2.93**	**14.69 1.13**	

Table 1 shows the mean score of teachers and students on the importance of artificial intelligence in teaching economics analytics concepts to students. It was indicated in the table that the mean score of teachers and students was above the criterion mean of 2.50. This is an indication that all the items where agreed on by the teachers and students, implying that artificial intelligence is important in teaching economics analytics concepts.

Research Question 2: What are the challenges of using artificial intelligence in the teaching of economics analytics concept?

Table 2: Challenges of using artificial intelligence in the teaching of economics analytics Concept

S/N	Item Statement	Lecturer n=36			Students' n=176		
		$\bar{X}$	**SD**	**Decision**	**$\bar{X}$**	**SD**	**Decision**
1	The existence of AI can reduce students' interest in reading economics textbooks	2.89	1.24	Agree	2.76	1.22	Agree
2	AI replaces the role of economics lecturer as student educators	3.22	1.05	Agree	3.29	.99	Agree
3	Economics lecturer inability to use appropriate AI software's	3.08	1.05	Agree	3.06	.98	Agree
4	Economics students inability to effectively utilize AI tools	2.86	1.10	Agree	2.73	1.17	Agree
5	The application of AI reduces the economics lecturer teaching efficiency	3.14	1.13	Agree	3.13	1.21	Agree
	Mean of Means	**15.19 3.04**	**5.57 1.11**		**14.97 2.99**	**5.57 1.11**	

Table 2 shows the mean score of lecturer and students on the challenges of using artificial intelligence in the teaching of economics analytics concept. It was indicated in the table that the mean score of teachers and student was above the criterion mean of 2.50. This is an indication that all the items where agreed on by the lecturer and students, implying the major challenges of using artificial intelligence in the teaching of economics students' analytics concept

Null Hypothesis 1: There is no significant difference between the mean ratings of economics lecturer and economics students on the importance of artificial intelligence in teaching economics student's analytics concepts?

Table 3: Means standard deviation and z-test of different between the mean ratings of lecturer and students on the importance of artificial intelligence in teaching economics student's analytics concepts

Status	Number	DF	Mean	SD	Z-Cal	Z-Critical	Decision
Lecturers	36		3.03	1.12			H_0:
Students	176	211	2.93	1.13	±0.759	±1.960	Accepted

Table 3 shows the Z-test analysis of difference between the mean ratings of economics lecturer and economics students on the importance of artificial intelligence in teaching economics student's analytics concepts. The mean score and standard deviation of the 36 lecturer 3.03 and 1.12 respectively while the mean score and standard deviation of the 176 students are 2.93 and 1.13 respectively. With a degree of freedom of 211 and the Z-test statistics application, it revealed that Z- calculated is 0.759 while Z- tabulated is 1.96. Since the Z-calculated is less than the Z-tabulated, it shows that the null hypothesis is not rejected. The conclusion is that there is no significant difference between the mean ratings of economics lecturer and economics students on the importance of artificial intelligence in teaching economics student's analytics concepts.

Null Hypothesis 2: There is no significant difference in the response of lecturer and student's response on the challenges of using artificial intelligence in the teaching of economics analytics concepts.

Table 4: Means standard deviation and z-test of different between the mean ratings of lecturer and students on the challenges of using artificial intelligence in the teaching of economics analytics concepts

Status	Number	DF	Mean	SD	Z-Cal	Z-Critical	Decision
Lecturer	36		3.04	1.11			H_0:
Students	176	211	2.99	1.11	±0.898	±1.960	Accepted

Table 4 shows the Z-test analysis of difference between the mean ratings of economics lecturer and economics students on the challenges of using artificial intelligence in the teaching of economics analytics concepts. The mean score and standard deviation of the 36 lecturer 3.04 and 1.11 respectively while the mean score and standard deviation of the 176 students are 2.99 and 1.11 respectively. With a degree of freedom of 211 and the Z-test statistics application, it revealed that Z- calculated is 0.898 while Z- tabulated is 1.960. Since the Z-calculated is less than the Z-tabulated, it shows that the null hypothesis is not rejected. The conclusion is that there is no significant difference between the mean ratings of economics lecturer and economics students on the challenges of using artificial intelligence in the teaching of economics analytics concepts.

Discussion of Findings

Importance of artificial intelligence in teaching economics student's analytics concepts

The findings shows that direction of student interest towards statistical method, AI makes students interested in mathematical concepts, AI can look for best way teach advance mathematics of economics, AI helps students improve their individual analytical skills, The use of AI helps in immediate feedback by the students when faced with statistical problem, AI makes it easier for students to understand analytical conception in economics, with AI, it can identify behind students' lack of understanding in statistical approach in economics, AI helps students obtain answers to high analytical methods assignments given by teachers, AI makes it easier for students to find analytical study contents with easy learning approach, using AI can increase student productivity in econometrics, AI can minimize student errors in advance economics theory, AI can increase student creativity in handling economic theory concepts and AI's way of linking what students like with the subject matter makes students understand more and are enthusiastic about analytical concepts in economics. The study also revealed that there is no significant difference between the mean ratings of economics lecturer and economics students on the importance of artificial intelligence in teaching economics student's analytics concepts. Trisoni, et al (2023) the application of Artificial Intelligence can assist teachers in creating students who excel in learning, especially at the high school level. This explains the findings of the study that shows how important the application of AI in teaching analytical concepts to economics students. Similarly, Mustak, Salminen, Plé, and Wirtz, (2021) agreed that AI helps students obtain answers to high analytical methods assignments given by teachers and improve their search productivity.

The challenges of using artificial intelligence in the teaching of economics analytics concepts

Finally, the findings of the on the challenges of application of AI revealed that the existence of AI can reduce students' interest in reading economics textbooks, AI replaces the role of economics teachers as student educators, economics teachers inability to use appropriate

AI software's, economics students inability to effectively utilize AI tools, the application of AI reduces the economics teachers teaching efficiency. It also showed that there is no significant difference between the mean ratings of economics lecturer and economics students on the challenges of using artificial intelligence in the teaching of economics analytics concepts. Similar to these findings is Trisoni, *et al* (2023) whose findings also revealed that the existence of AI can reduce students' interest in reading textbooks and AI replaces the role of economics teachers as student educators. Brown, and Mbati, (2015) also pointed out that Digital literacy of both learners and educators remains a challenge. This pose as a serious challenge in the application of AI in teaching and learning, especially in teaching economics analytical concepts due to its high mathematical, statistical and economics methodology.

Conclusion

Application of AI in teaching economics analytical concepts is that they can enhance the learning experience by providing personalized and interactive content. AI tools/devices can also help students to identify and address their weaknesses and improve their overall academic performance. However, there are also some potential drawbacks to using AI tools/devices in economics analytical concepts. One concern is that these students may become overly reliant on technology and fail to develop critical thinking and problem-solving skills. Additionally, some critics argue that the use of AI tools/devices may lead to a decrease in the quality of education as teachers may rely too heavily on automated systems instead of engaging with their students.

Recommendations

The following recommendations were made

1. Since the study found the importance of AI in teaching economics analytical concepts as very important, its necessary the Federal Government though the federal ministry of education should adequately prepare teachers through seminars, conferences and workshop on digital literacy to efficiently use and apply AI in teaching.
2. There is need by the education authority like, National University commission (NUC) should develop and implement policies regarding the application and use of AI, both as a tool for teaching and learning economics analytical concepts, also for use in administration.

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