INFLUENCE OF THE UTILIZATION OF GENERATIVE ARTIFICIAL INTELLIGENCE "ChatGPT" ON THE ENGAGEMENT IN CRITICAL THINKING AMONG UNIVERSITY OF BENIN UNDERGRADUATE STUDENTS

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Abstract
The study assessed the influence of generative artificial intelligence "ChatGPT" on engagement in critical thinking among University of Benin undergraduate students. Correlational research design was adopted as a research design for the study. The population of the study consisted of 43,469 full-time undergraduate students in 15 faculties. Simple random sampling by ballot method and the proportionate to size sampling technique was used to select the six faculties and 400 students for the study. Data were collected using a structured questionnaire titled ChatGPT use and Critical Thinking Questionnaire (CGCTQ). It was validated by three lecturers from the department of Educational Evaluation and Counseling Psychology of the University. The reliability of the instrument was determined using Cronbach Alpha Reliability Statistics to obtain a reliability coefficient of 0.83. Collected data were analyzed using mean and standard deviation to answer research questions while Pearson product moment correlation (PPMC) and Fisher's Z- test were used to test the hypotheses. The hypotheses were tested at 0.05 level of significant. Findings of the study revealed that there is a high level of utilization of ChatGPT and a high level of engagement in critical thinking among the students. ChatGPT influences students' engagement in critical thinking and also there was no significant difference by sex in the relationship between students' use of ChatGPT and engagement in critical thinking. In line with the findings, the use of ChatGPT by students' is therefore recommended as against its complete abolishment. Measures also should be put in place to promote its healthy use, in other to prevent its use affecting students' engagement in critical thinking.

Keyword: Utilization, Generative Artificial Intelligence, Chatgpt, Engagement, and Critical Thinking.

Introduction

The quest of man to live a much easier and less tasking life has led to numerous technological inventions among which are those driven by Artificial Intelligence (AI). AI deals with the application of software in machines to enable these machines do that which originally requires human intelligence for its performance. It is a branch of computer science which deals with the scientific study

of what problem can be solved, what task can be accomplished and what feature of the world can be understood computationally and then provides algorithms to show how this can be done efficiently, practically, physically and ethically (Rapaport, 2017). Artificial intelligence when possessed by machines enables them solve problems, perform tasks and understand information inputted into them.

Artificial Intelligence (AI) is broad in nature and has received several categorizations. UNESCO (2023) categorized AI based on capability into Artificial Narrow Intelligence (ANI) also known as Weak AI and Artificial General Intelligence (AGI) also known as strong AI. ANI as a machine intelligence is not capable of feeling but capable of performing singular tasks which can be in form of only facial recognition, playing of songs, searching for information on the internet among others. ANI is the type of AI that has been achieved so far. The achievement of AGI would put AI in the position where it will be possible to compare it to human intelligence. A machine intelligence that can perform equally as Human intelligence has therefore not been attained yet. Another AI under this classification is the Super AI, which is presently not yet in existence for use (UNESCO, 2023).

Similarly, Saleh (2019) classified AI based on functionality to include Purely Reactive AI, Limited Memory AI, Theory of the Mind AI and Self Aware AI. The purely reactive AI is the basic type of AI that is based on function. It performs basic operation and lacks the ability to store inputs to determine future operations. Limited Memory AI is higher in functionality as it stores past input, though for a short duration and observes the relationship between past and present input in order to perform better in its task. It has the ability of improving on its programming based on input from its user. Theory of the mind AI is the next in hierarchy of AI classification based on functionality and is still in its stage of development. It is an AI aiming to perceive human emotions and adjust their behavior in accordance to it. Self-Aware AI as noted by the above author is a hypothetical AI, which will not only be aware of human's emotions but also be able to recognize its own emotion. Among the various AI categorizations which are all aimed to complement human intelligence, is the Generative Artificial intelligence (GAI), which falls under ANI and Limited memory AI.

The human intelligence for which AI is intending to be a complement possesses the ability to perceive, recognize speech, think abstractly, plan action, learn, form memory, communicate and solve problems; these also AI is gradually achieving through Machine Learning; a subset of AI that utilizes data and algorithms (a set of instructions, rules or programming that allows machines to learn, analyze data and make decisions based on knowledge developed and inputted by programmers) to discover and develop its own algorithms. Consequently, with the use of machine learning, AI driven tools that posse the ability to perform tasks that were originally specific to the usage of human intelligence are gradually being developed and improved.

The recent expansion in machine learning, led to the development of Generative Artificial Intelligence (GAI) Hu (2022), which is an unsupervised or partially supervised machine learning framework which generates man made relics via the use of statistics and probabilities, (Jovanovic and Campbell, 2022). As a form of AI, its presence in a machine enables the machine to accept inputs, learn from such inputs and generate appropriate responses to such inputs in the way a human will respond to the same input. GAI is of a different type among which is the Generative Pre-trained Transformer (GPT), which in the view of Baidoo-Anu and Ansah, (2023) uses large amount of publicly available digital content data (Natural Language Processing [NLP]), to read and produce human-like text in several languages and can exhibit creativity in writing from a paragraph to full research article convincingly (or non-convincingly) on almost any topic. Currently, GPT is the basic Natural Language Processing engine that runs the recently developed language model ChatGPT.

ChatGPT stands for Chat Generative Pre-trained Transformer. It is a language model that uses advanced artificial intelligence techniques to generate natural language responses to a given prompt or input (Dinesh & Nathan, 2023). It possess the ability of carrying out highly intelligent tasks such as replying to examination styled questions, addressing homework assignments, drafting academic essays and automatically generating contract (Xiaoming, 2022). As a generative AI tool, it has the ability to generate text related responses similar to that a human will generate. This it does by utilizing the algorithm (instructions) with which it was trained and the algorithm which it has developed by itself. It creates its own algorithms through saving information on previously done tasks and finding the relationship between such tasks and the present tasks it is meant to carry out. Just like every other AI inventions, it has gained wide application, as it is being used both in the health sector, finance sector, retail and e-commerce sector and even in the educational sector which according to Avijeet (2023), is a sector that is mostly influenced by humans; but has slowly begun to allow artificial intelligence seep into its root. The educational sector of any country or state is concerned with teaching and learning. While teaching is aimed at impacting students, learning is geared towards the development of intelligence in students which is made possible through the use of cognitive abilities such as memory, attention, language and critical thinking at its core.

Critical thinking is the habitual use of cognitive skills that increase the probability of desirable outcome as well as the disposition to use these skills (Halpern and Butler, 2018).It is a concept that is accorded importance in educational sector worldwide. The various levels of education in Nigeria have the development of critical thinking as one of its objectives. According to reports from Association of American Colleges and Universities 2011, critical thinking has been recognized as an important skill to be developed and assessed in higher education in United States, United Kingdom and Australia. To develop critical thinking in students, the education sector utilizes measures such as encouraging students to engage in active

learning in form of responding to assignment, carrying out project work, engaging in classroom assignment, answering questions in class among others.

Gbenga, *et al.,* (2023) noted that large class size is a common phenomenon in Nigeria higher institutions especially in core courses. This could be a limiting factor to some of the aforementioned measures aimed at facilitating critical thinking among individual students in higher institutions as some of these measures if utilized in large classroom situation might be time consuming and energy sapping. This has resulted in the general utilization of measure such assignment and project as major means of administering questions that will aid the development of or spur critical thinking in students. Assignments, projects and other active learning tasks which are administered to students to perform on their own outside the classroom learning environment, are for the purpose of enabling students utilize and develop their critical thinking skill and other skills important to learning through the process of responding to such tasks personally. In responding to assignment, students are expected to understand the tasks before them, source for information regarding the tasks, analyze, synthesize and draw personal conclusion based on such information. They are expected to present responses to such tasks, based on their level of understanding. However, though this process is aimed at developing critical thinking in students, it is a long process, hence; it might be seen as tiring to engage in.

ChatGPT as GAI tool possesses the potentials of giving immediate, intelligent and human like responses to assigned tasks. Students now source it for information, in carrying out tasks that are aimed at facilitating their involvement in critical thinking. This could possibly be of effect on students engagement in critical thinking; either positively or negatively.

Considering the fact that critical thinking a cognitive ability significant to the education sector, aids intelligent response and is required by students in solving both learning and non-learning problems also has the possibility of being influenced by the recently introduced generative AI tool "ChatGPT". It is therefore pertinent that a study be carried out to determine the nature and extent of its possible influence especially among students of higher education who are more prone to its usage, due to their access and awareness of technological gadgets. It will also enable the adoption of appropriate precautionary measures needed for its use. Hence this study is aimed at investigating the influence of the Utilization of Generative Artificial Intelligence "ChatGPT" on the engagement in critical thinking among University of Benin undergraduate students., by finding out: the level of utilization of ChatGPT among University of Benin undergraduate students, the level of engagement in critical thinking among University of Benin undergraduate students, the relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking, the difference in the relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking by sex, and the difference in the relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking by socio-economic status.

Research Questions

1 What is the level of utilization of ChatGPT among University of Benin undergraduate students?

2 What is the level of engagement in critical thinking among University of Benin undergraduate students?

Hypotheses

1. There is no significant relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking.
2. There is no significant difference in the relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking by sex.

Methodology

The correlational research design was adopted for this study. It is a research design that seeks to find the relationship between two variables. The population of this study consisted of all 43,469 full-time undergraduate students from University of Benin from which a sample of 400 students were selected. The multistage sampling procedure was adopted in this study in selecting the sample: The balloting form of simple random sampling technique was then used to get six (6) faculties representing 40% of the fifteen (15) faculties that make up the University. Proportionate by size sampling technique was used to select the number of students from each sampled faculties. The study employed the use of a structured questionnaire titled ChatGPT Use and Critical Thinking Questionnaire (CGCTQ) that contained 26 items adapted from Unified Theory of Acceptance and Use of Technology (UTAUT) scale of Venkatesh *et al*. (2012), and items from Critical Thinking Questionnaire (CThQ) of Kobylarek, *et al*. (2022) as instrument for data collection. The UTAUT scale contains 28 items while the CThQ has 25 items. 10 and 16 items that suit the study were taken from the UTAUT and CThQ, These items were modified to the cultural background. The study instrument was validated by three lecturers from the department of Educational Evaluation and Counseling Psychology of the University. The reliability of the instrument was determined by using Cronbach Alpha Reliability Statistics method of analysis to analyze the responses of twenty (20) university students outside the target population under study, to whom the questionnaire was administered and a reliability coefficient of 0.83 was obtained indicating that the research instrument has high reliability. Research questions were answered using mean and standard deviation while the hypothesis was tested using Pearson product moment correlation (PPMC). The hypothesis were tested at 0.05 level of significance.

Results

Research Question One: What is the level of utilization of ChatGPT among University of Benin undergraduate students?

Table 1: Description of utilization of ChatGPT among University of Benin undergraduate Students

Variable	N	Sum	Mean	SD	Scale Mean	Decision
ChatGPT Utilization	400	12103.00	30.26	6.57	25.0	High

Table 1 shows the level of utilization of ChatGPT among University of Benin undergraduate students. The table shows that of the 400 respondents, a mean value of 30.26, standard deviation of 6.57 and a scale mean of 25.0 was obtained. From the result, the mean value is greater than the scale mean and this implies that the level of utilization of ChatGPT among University of Benin undergraduate students is high. Consequently, the students' utilization of ChatGPT

Research Question Two: What is the level of engagement in critical thinking among University of Benin undergraduate students?

Table 2: Description of Engagement in Critical Thinking among University of Benin Undergraduate Students

Variable	N	Sum	Mean	SD	Scale Mean	Decision
Critical Thinking Engagement	400	21110.00	52.78	6.68	40	High

Table 2 shows the level of engagement in critical thinking among University of Benin undergraduate students. The table shows that of the 400 respondents, a mean value of 52.78, standard deviation of 6.68 and a scale mean of 40 was obtained. From the result, the mean value is greater than the scale mean and this implies that the level of engagement in critical thinking among University of Benin undergraduate students is high. Consequently, the students' are engaged in critical thinking

Hypothesis One: There is no significant relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking.

Table Three: Correlation Analysis of Students' use of ChatGPT and Engagement in Critical Thinking

Variables	N	r	Sig. (2-tailed)
ChatGPT Utilization Critical thinking Engagement	400	.144	.004

The correlation coefficient between students' ChatGPT utilization and critical thinking engagement is .144 with a p-value of .004 (table 3). Testing at an alpha level of 0.05, the p-value is less than the alpha level of significance ($p<0.05$) and as such the null hypothesis which states that "There is no significant relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking" is rejected. Consequently, there is a significant relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking.

Hypothesis Two: There is no significant difference in the relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking by sex.

Table 4: Fishers Z- Test Analysis of Students' use of ChatGPT and Engagement in Critical Thinking by Sex

Variables (Sex)	N	r	Zr	Z-cal.	Z- value
Male	212	0.254	0.255	.544	.196
Female	188	0.031	0.03		

Table 4 shows the Fishers Z-statistic of rate of students' use of ChatGPT and engagement in critical thinking by sex. The coefficient values of male and female undergraduate students are 0.54 and 0.031 respectively. Testing at an alpha level of 0.05, the calculated Z of 0.544 is less than the critical value of 1.96. With this, the null hypothesis which states that "There is no significant difference in the relationship between University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking by sex" is retained. Consequently, no significant difference exist in the relationship between the male and female University of Benin undergraduate students' use of ChatGPT and engagement in critical thinking.

Discussion of Findings

The result of the study in Table1 revealed that University of Benin undergraduate students, showed high level of utilization of ChatGPT. It was discovered via analysis of gathered data that a high percentage of the students make use ChatGPT in their academics. The implication of this is that, it will influence the learning pattern of students in academic settings. This finding is in consonant with that of Garrel and Mayer, (2023) who reported that two third of the students surveyed across Germany had used or were using Ai-based tool, with the major one being ChatGPT. Also the result of the study in Table 2 revealed a high level of engagement in critical thinking as a high percentage of them make use of critical thinking skills in their academics. The implication of this is that, it will enable further development of their critical thinking skill, which will further enable the improvement of their problem solving ability. This finding disagrees with that of Fadhlullah and Ahmad (2017) who observed that students' critical thinking skills ranged from low to moderate level.

The result of the study in Table 3 revealed that University of Benin undergraduate students' use of ChatGPT has a significant relationship with their engagement in critical thinking. This means that students' use of ChatGPT has influence on their engagement in critical thinking with the implication of either enhancing their engagement in critical thinking or influencing it negatively. From the findings of research question one and two which show high use of ChatGPT and engagement in critical thinking among University of Benin undergraduate students respectively, it can be deduced that ChatGPT has a positive influence on University of Benin undergraduate students' engagement in critical thinking. This is in consonance with Essel *et al*., (2023), who stated that incorporating ChatGPT into learning influenced students' critical thinking skills.

Also the result of the study revealed that the students' use of ChatGPT has no significant relationship with their engagement in critical thinking by sex as shown in Table 4. The implication of this is that, the influence of ChatGPT use on engagement in critical thinking among male undergraduate students' of University of Benin, is not different from the influence of ChatGPT use on engagement in critical thinking among the female students'. This finding agrees with that of Jose-Maria *et al*. (2023) which showed that sex does not stands as a determinant factor to perception of facilitating conditions, hedonic motivation and behavioural intention to use ChatGPT.

Conclusion

Critical thinking is a skill that occupies a core position in students' learning. Its development is enabled through exposure to various academic tasks which are sometimes text related. However, it has been found that most undergraduate students in University of Benin are utilizing ChatGPT to generate responses to these academic tasks, which is gradually influencing their engagement in critical thinking. It is therefore necessary for students to identify possible advantageous ways to utilize

ChatGPT to prevent its use from having a negative effect on their engagement in critical thinking.

Recommendations

In view of the findings from the study, the following recommendations are made:

1. The use of ChatGPT by students' should be encouraged however measures should be formulated to promote its healthy use, in other to prevent its use affecting students' engagement in critical thinking.
2. Seminars and workshop should be organize for the undergraduate students on the importance and ways of developing and facilitating their engagement in critical thinking to help those struggling to build critical thinking.

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