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Article

Influence of artificial intelligence on educational performance of Nigerian students in tertiary institutions in Nigeria

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Abstract: This research was conducted using a survey research method to investigate the influence of Artificial Intelligence (AI) on Nigerian students' academic performances in tertiary institutions. Nigerian tertiary institutions have an estimated population of about 2.5 million students across the universities, polytechnics, monotechnics, and colleges of education. A sample size of 509 was used. The researchers adopted an online questionnaire (Google Form) to administer questions to respondents across Nigeria to elicit responses from the respondents bordering on their awareness and the use of AI and its attendant impacts on their academic performance. Five research objectives were raised for the proper investigation of this study. From the findings of the study, the researchers found that the majority of Nigerian students use AI and that AI has positive impacts on the educational performance of Nigerian students. It was also found that Nigerian students have training on the use of AI for educational purposes and that they are more familiar with Snapchat AI and ChatGPT. Conclusively, AI is useful to students in the sense that it enhances their knowledge of their courses, improves their learning and speaking skills, and helps them to have a quick understanding of their course by way of simplifying technical aspects of their courses. The researchers therefore recommend as follows: Nigerian tertiary institutions should formally train students as well as teachers on the use of AI for academic purposes so that they can understand the ethical implications of the use of AI. Using AI for writing could be interpreted to mean examination malpractice, and this should not be condoned in the educational sector; however, at the moment, a small number of students used AI for examinations. Albeit, the appropriate use of AI should be fully integrated into Nigerian tertiary institutions' curricula.

Keywords: academic performance; artificial intelligence; education; Nigerian students; tertiary institution

1. Introduction

1.1. Nigerian educational system

Nigeria adopted the 6-3-3-4 educational system in 1983. This is a kind of educational system that allows for a six-year study at the primary school level, which

is the beginners' level. The primary school system admits children from the age of five or six into the primary one class, and by 11 to 12 years they are on the way out into the second level of the educational system called the secondary school. In the secondary school system, a child is expected to spend three years in the first stage called junior secondary school. At this stage, the child offers basic and compulsory subjects such as English Language, Mathematics, Integrated Sciences, Computer Sciences, Agricultural Sciences, Business Study, and Religious Studies (Ngonso et al., 2024; Ukhurebor et al., 2024a, 2024b).

The Nigerian educational system is usually structured into terms (first, second, and third), and students are assessed for their performances termly, and upon satisfactory performance, a student is promoted in his/her third term into the next class. At the junior secondary level, students sit for their promotion examinations, usually coordinated by each state of the federation. In the following academic year, such students who have passed the examination are promoted to the next class, which is the first class in the second stratum of the secondary school system called the senior secondary school (Ngonso et al., 2024; Ukhurebor et al., 2024a, 2024b).

The senior secondary takes another three years of the student's study. At this level, the student is exposed to subjects such as English Language, Mathematics, Chemistry, Physics, Agricultural Sciences, Literature in English Language, Further Mathematics, Biology, Computer Sciences, Religious Study, Commerce, Government, and History. In the first year (senior secondary one), a student is compelled to offer all the available subjects, while in senior secondary 2, a student is allowed to make choices leading to an area of specialization, which could be arts-orientated, science-orientated, or commercial-orientated (Hussaini et al., 2023). In any case, a student is compelled to offer English Language and Mathematics as compulsory subjects in all the areas of specialization (Ngonso et al., 2024; Ukhurebor et al., 2024a, 2024b).

This then prepares the students for the final task of writing the certificated examination and tertiary institution admission examination. These two examinations are coordinated by separate bodies under the Federal Ministry of Education. For the certificated examination, two bodies conduct separate examinations, and they are the West African Examination Council (WAEC) and the National Examination Council (NECO). A student willing to further his/her education is asked to write an entrance examination usually organized by the Joint Admission and Matriculation Board (JAMB) called the Unified Tertiary Matriculation Examination (UTME). This body is solely responsible for organizing tertiary institutions' entrance examinations and setting standards and criteria for admission into the universities, polytechnics, monotechnics, and colleges of education in Nigeria (Hussaini et al., 2023; Ngonso et al., 2024; Ukhurebor et al., 2024a, 2024b).

1.2. The tertiary education system in Nigeria

Nigeria is a very large country with an estimated population of over 200 million people and several tertiary institutions. It is also estimated that Nigeria has about 274 universities owned by the state government, federal government, and private sector, and about 183 polytechnics and 179 monotechnics owned in the same structure with well over 11 million students (Asquare, 2024).

Like every other sector, the Nigerian tertiary educational system is challenged in so many areas. Notable amongst them is the issue of corruption. According to some scholars (Alagbe, 2022; Egielewa and Adejumo, 2021; Egielewa, 2022; Ngonso, 2022), corruption cases in the Nigerian tertiary institutions range from examination malpractices, sex for marks, certificate racketeering, admission racketeering, favoritism, tribalism, indecency, cultism, poor recruitment of staff, lack of staff, and unsafe environment (Asanga et al., 2023; Amadasun et al., 2024; Sinan et al., 2024). According to Ukhurebor et al. (2024a, 2024b), "Nigerian educational system, as well as the nation, is suffering from social degeneracy, confusion in governance, moral decadence, corruption and corrupt practices, un-wanted destruction of lives and properties by Boko Haram insurgency, nefarious acts of Fulani herdsmen, and kidnapping for ransom, which has its untold effect on teaching and learning". According to these scholars, these ugly developments have degraded impact on the dominant core values, which have been trampled upon in the educational sector and the Nigerian society (Mai-inji et al., 2024; Nneji et al., 2022; Ndunagu et al., 2023). Other factors that affect the tertiary educational system in Nigeria include poor pay, plagiarism, students' seriousness to lectures, teachers' lack of commitment, stealing and averting of research funds, money laundering by institution administrations, moonlighting, lack, and poor teaching and learning equipment.

Artificial intelligence (AI) is in the domain of information and communication technology (ICT). It has been speculated that Nigerian universities are very slow to catch up with the use of ICT in teaching and learning. A study conducted by Ngonso et al. (2018) on the use of ICT in teaching mass communication revealed that lecturers and students were unable to tap into the full potential of interactive media. The use of this new technology in the Nigerian educational setting has been studied by a few scholars. In a study conducted by Inyaoiza (2024), findings showed that the students are aware of AI and do use it for academic purposes. The result of the study also showed that 233 respondents, representing 58.3%, used Snapchat AI for educational purposes. This also implies that in every 10 students at the Federal University Lokoja, 5 used Snapchat AI for academic purposes. The findings of this study further showed that students used Snapchat AI for assignments more compared to other aspects of their study. The data showed that 125 (31.3%) out of 400 students used AI for assignments, and 288 (72%) out of 400 respondents agreed that the use of Snapchat AI has improved their knowledge of their course of study. The findings also revealed that 168 (42%) respondents believed that Snapchat AI improved their understanding of their course of study through simplification of topics, while 105 (26%) said that AI provides practical examples. This study did not examine whether or not students have received formal training in the use of AI for academic purposes. This result collaborated with the Ngonso et al. (2018) study on the influence of Twitter on the cognitive development of Nigerian students. In this study, the authors found that Twitter now '*X*' very engaging and useful, which resulted in its everyday usage, increasing their knowledge, which aided their cognitive development. The researchers concluded that there is a significant positive relationship between the influence of Twitter and the cognitive development of youths and therefore recommended that institutions of higher learning in Nigeria should use Twitter as an educational and learning tool.

Nigeria is a self-proclaimed giant of Africa, and many African nations look up to Nigeria as a country in many areas, including education. Nigeria prides itself on being the education hub of the African continent. In today's educational system, technology is changing everything from the Canvas Learning Management System to AI. Ivy League universities have since keyed into the use and utilization of these ground-breaking technological advancements in AI, both on the part of the teachers as well as the students. Seminars and workshops have been organized for teachers and students on the use of this technology. However, third-world countries may be lagging. Since Nigeria is among the third-world countries despite its claims to be the giant of Africa in all spheres of endeavor, including education, it therefore becomes pertinent to find out Nigerian students' level of understanding and utilization of AI in their educational pursuit in tertiary institutions.

The following objectives were framed to guide the course of conducting this research:

1) To find out the level of awareness of the use of AI for educational purposes
2) To ascertain the aspect of the students' study, AI is mostly utilized.
3) To find out the preferred AI
4) To find out if there is formal training students received from their instructions about AI use for academic purposes
5) To ascertain the nature of the influence of AI on students' educational performance

2. Artificial intelligence

AI is integrated in the words Artificial and Intelligence; "artificial" describes something created or manufactured by humans as opposed to existing naturally; it usually serves as a copy or stand-in for something natural. The word originates from the Latin "artificialis," which is a compound word meaning "skill" or "craft" and derived from "artificium." When referring to technological objects, the term "artificial" frequently denotes human-made creations that simulate or reproduce natural processes; on the other hand, "intelligence" is the capacity to learn, comprehend, and use information and abilities. It encompasses a range of cognitive functions, including language comprehension, learning, problem-solving, reasoning, and perception. There are several ways that intelligence might appear, including:

Analytical intelligence: the capacity for problem-solving, analysis, and evaluation; frequently linked to critical thinking and logical reasoning.

Creative Intelligence: The ability to think creatively, come up with original ideas, and handle problems in fresh ways is known as creative intelligence.

Practical intelligence: this encompasses the capacity to function in a variety of settings, handle daily responsibilities, and comprehend social circumstances.

Emotional intelligence: The capacity to identify, comprehend, and regulate one's own emotions as well as those of others is known as emotional intelligence, and it's frequently associated with empathy and social skills.

Intelligence in its sense is broad and varies; another broad but exceptional example of this is the term "artificial intelligence," which describes software or hardware systems intended to carry out operations that would typically need human

intelligence. Rossi (2019) argues that AI is the imitation of human intellect in machines with cognitive, adaptive, and learning capacities comparable to those of humans. These systems can do tasks that often require human intellect, such as speech recognition, visual perception, decision-making, and language translation. The goal of the scientific field of AI is to create machines that are capable of carrying out a wide range of tasks that call for human intelligence. AI has continuously evolved into influencing stages of transformative processes in different institutions and different fields of study. Cockburn et al. (2018) assert that Atomize, a company that uses cutting-edge technology such as neural networks to predict the bioactivity of candidate molecules to uncover possible medication candidates (as well as insecticides). According to the business, its deep convolutional neural network performance "far surpasses" that of traditional "docking" techniques. Following the proper training on enormous amounts of data, the business's AtomNet product is said to be able to "recognize" the fundamental components of organic chemistry and be able to produce extremely precise forecasts of the results of actual physical investigations (Wallach et al., 2015). Suffice it to say here that Atomwise's technology and that of other companies leveraging on AI to advance drug medical diagnosis or any other field, as seen in the field of media (broadcasting), is doing so at an accelerated speed, which is equally a plus in the world of innovation.

The academic community has also aligned with the novel advantage of AI, as it has become obvious that AI can drastically alter how researchers collaborate, publish papers, do research, meditate, teach, and learn. As a result, scientists everywhere are becoming increasingly interested in AI due to its immersive benefits. Furthermore, intelligent virtual reality and its use in simulation-based teaching and learning are examples of how AI, according to Pokrivcakova (2019), enables the creation and implementation of intelligent training systems and adaptive content that are tailored to individual-specific instructional requirements and abilities.

Applications of artificial intelligence in education

It has been hypothesized that AI will revolutionize education by transforming how knowledge can be acquired, managed, and presented. AI can completely transform education, from designed learning environments to computerized administrative functions. The need for comprehensive answers to instructional issues, the availability of larger datasets, and the advancements in machine learning are the main drivers of the increased interest in AI applications in education. Pokrivcakova (2019) affirmed that AI allows for the creation and use of intelligent training systems and flexible content that are personalized to each student's particular learning requirements and skills, such as intelligent virtual reality and its use in simulation-based teaching and learning. Researchers are at liberty to the advantages of AI; through the adoption of AI to automate hard tasks, academicians can also focus on more challenging issues. Moreover, by utilizing AI-powered technology, academics may find information, assess data, and identify trends in vast databases. AI is also capable of producing projections and insights that would be challenging for humans to generate. Predictive analytics powered by AI, for instance, can be utilized to predict student performance and pinpoint areas in need of more support. Pokrivcakova (2019).

3. Methodology

This study adopts a survey research method. The researchers decided to adopt this method because of the nature of the study, which has to do with the behavior of the students with regards to the influence of the use of AI for their study. The population of the study is the entire population of Nigerian tertiary institutions (the total number of tertiary institutions in Nigeria is 841; see **Table 1** for the breakdown as adapted from Asquare (2024); Myschoolgist (2024); Statista (2024)), which include universities, polytechnics, monotechnics, and colleges of education. These are the known tertiary institutions in Nigeria.

Table 1. The total number of tertiary institutions in Nigeria.

Type of Institution	Total Number
University	274
Monotechnics	183
Polytechnic	179
College of Education	205
Total	841

However, the total population of students as of 2024 in Nigerian tertiary institutions is approximately 2.5 million (Asquare, 2024). Therefore, the population of this study stood at 2.5 million. The sample size of the study was 500, using Wimmer and Dominick's (2003) calculation, which posits that, in larger population and multivariate studies, 50 = very poor; 100 = poor; 200 = fair; 300 = good; 500 = very good; 1000 = excellent. The researchers adopted the online questionnaire model to distribute the questionnaire to the respondents. The researchers chose this technique because of the large sample size scattered across the entire country. This is therefore considered the best approach. The Google link was shared on email, WhatsApp, Twitter, and Facebook platforms, of which 509 respondents participated. Since the target sample size was earlier stated as 500, the additional nine (9) were quite insignificant, and the researchers decided to ignore them.

4. Data presentation, analysis, and discussion of findings

Research question 1: What is the level of awareness of the use of AI for educational purposes?

Research question one was translated from objective question one. From **Figure 1**, 183 (36%) respondents out of 509 said that they are very aware of AI, and 195 (38.5%) respondents said that they are aware of AI. This implies that 378 (74.3%) of the respondents are aware of AI, meaning in every 10 Nigerian students, 7 are aware of AI. This can further be interpreted to mean that the majority of Nigerian students in tertiary institutions are aware of AI. This finding tallies with Inyaoiza's (2024) findings, which showed that 233 respondents out of 400, representing 58.3%, used Snapchat AI for educational purposes. This also implies that in every 10 students of the Federal University Lokoja, 5 used Snapchat AI for academic purposes.

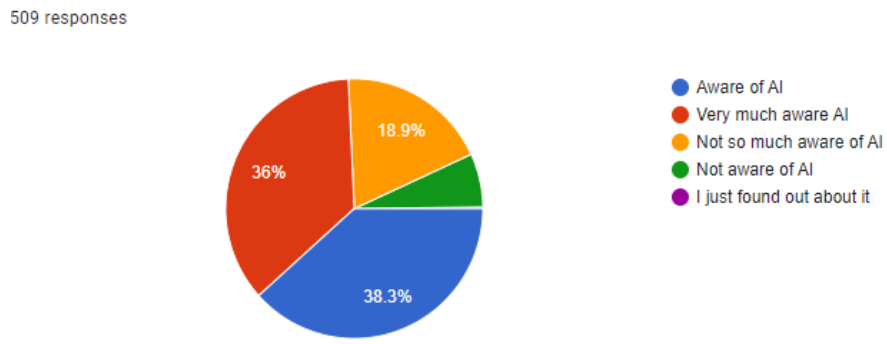

Figure 1. The level of awareness of AI by students.

Research question 2: In what aspect of the study is AI mostly utilized?

Figure 2 provides answers to research question 2. The data presented in **Figure 2** indicated that students mostly used AI for their assignments. 160 (31.4%) respondents attest to this, while 100 (19.6%) respondents said that they used AI for project writing, 103 (20.2%) said they used it for self-study, and 56 (11%) said they used it for after-class study. 31 (6.1%) respondents used it for group studies, while 1 (0.2%) respondent used it for research. This also implies that 451 (88.5%, approximately 90%) respondents used AI positively to advance their study. It could also be interpreted to mean that, in every set of 10 Nigerian students, 9 used AI to advance their educational pursuits. The import here is that AI has minimal negative influence on Nigerian students' educational performance. The data from this study further supported the above view, as it indicates that 49 (9.6%) respondents said they used it for examination, which could also be interpreted as examination malpractice, and 2 (0.4%) respondents said they did not use it because they do not know what AI is about. The implication is that in every 10 Nigerian students, only one used AI negatively. The above findings again align with Inyaoiza's (2024) findings that showed that students used Snapchat AI for assignments more compared to other aspects of their study. The data showed that 125 (31.3%) out of 400 students used AI for assignments, and 288 (72%) out of 400 respondents agreed that the use of Snapchat AI has improved their knowledge of their course of study.

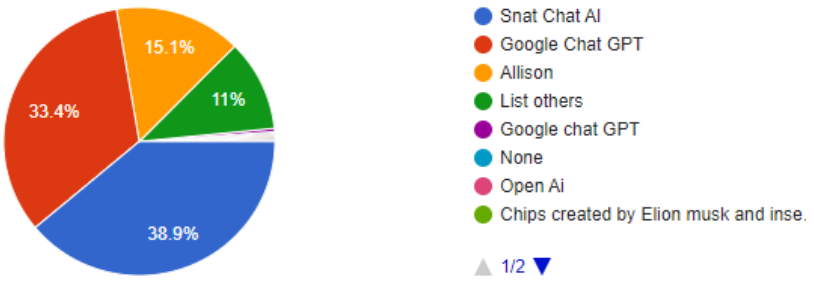

Figure 2. The aspect of studies that students utilized AI most.

Research question 3: Which AI tools do students prefer?

Figure 3 provides the answer to the question. 198 (38.9%) respondents said they are familiar with Snapchat AI, while 170 (33.4%) respondents are familiar with

Google Chat GPT. 77 (15.1%) respondents are familiar with Allison. The import here is that Nigerian students in tertiary institutions are very familiar with Snapchat AI and Chat GPT. This result again agrees with Inyaoiza's (2024) result, which showed that 233 respondents, representing 58.3% out of 400, used Snapchat AI for educational purposes.

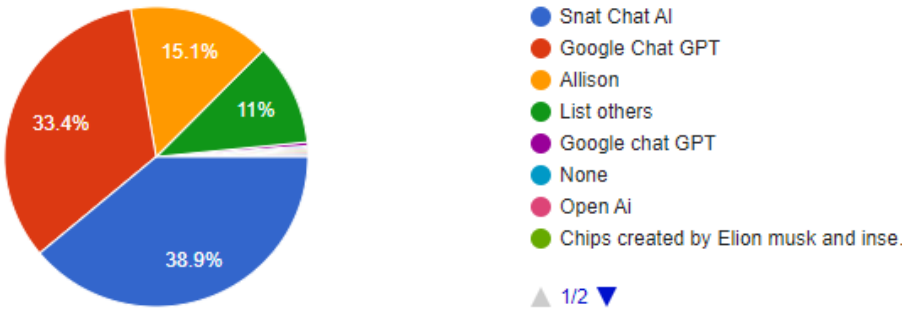

Figure 3. The AI tool that students are more familiar with.

Research question 4: Do Nigerian students receive training on the use of AI?

Figure 4 presents data that answered research question 4. The data showed that 298 (58.5%) respondents have received training on the use of AI for academic purposes. 144 (28.1%) respondents have not received training on the use of AI for academic purposes, and 67 (13.25%) could not ascertain whether or not they have received training on the use of AI. The data could also be interpreted to mean that, in every 10 Nigerian students, 6 have received training in the use of AI for academic purposes and 3 have not, while 1 out of every 10 is not sure of receiving training on the use of AI. This study did not interrogate the type of training, whether formal or informal, in the use of AI for academic purposes. The study did not also interrogate those who trained the students, whether they were trained by their institutions or some other organizations. This is the gap created in this study that should be looked at by other scholars who may be willing to conduct research in this area.

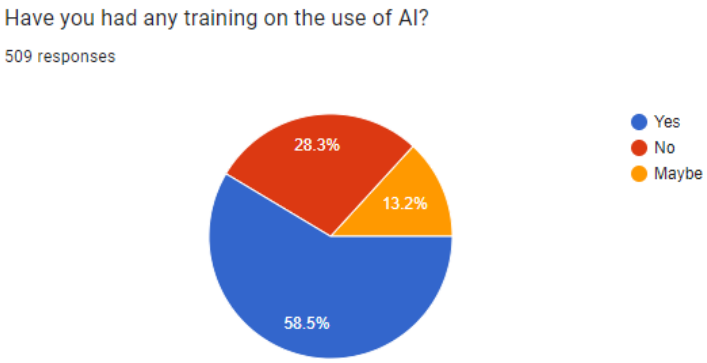

Figure 4. Responses on whether or not Nigerian students have received training on the use of AI.

Research question 5: What is the nature of the influence of AI on the educational performance of Nigerian students?

Figure 5 contains the data that answers research question 5. The data showed that AI has both positive and negative impacts on Nigerian students' educational performance. However, the weight of the impacts is more on the positive than the negative. The data showed diverse positive impacts. For instance, 134 (26.3%) of the respondents said that AI improved their knowledge of each subject they used AI for, while 125 (24.6%) respondents rated AI's impact on their study and concluded that AI has impacted their learning skills. Similarly, 101 (19.8%) respondents said that AI simplified technical areas of their disciplines. 76 (14.9%) respondents agreed that the use of AI gives them a quick understanding of the subject, and 21 (4.1%) respondents alleged that AI improves their language skills. This implies that AI has a high positive impact on the educational performance of the Nigerian students. This also implies that 457 (89.7, approximately 90%) students have been impacted positively by AI and that in every 10 Nigerian students, 9 of them have been impacted positively by AI.

On the negative impacts of AI on Nigerian students' educational performance, the data showed that 27 (5.3%) respondents said that they rarely read their books because of the use of AI, and 19 (3.7%) respondents said that they have become lazy due to the use of AI. The import is that 1 out of every 10 Nigerian students has been negatively impacted by AI.

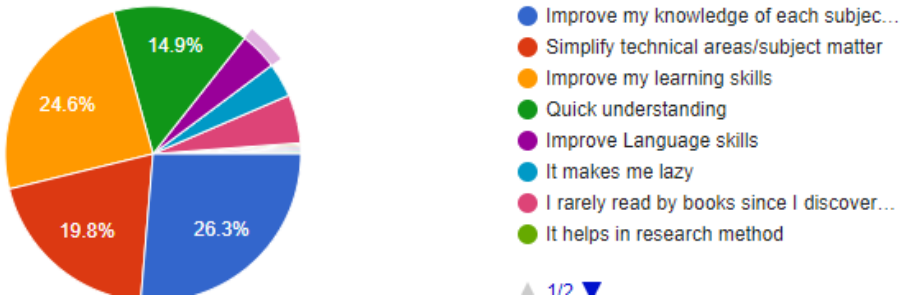

Figure 5. Measuring the level of impact AI has on the educational performance of Nigerian students.

5. Conclusion and recommendations

This study adopted a survey research method to investigate the influence of AI on Nigerian students' academic performances in tertiary institutions. Nigerian tertiary institutions have an estimated population of about 2.5 million students across the universities, polytechnics, monotechnics, and colleges of education. A sample size of 500 was used with an excess of 9, making the exact sample size 509. The researchers adopted an online questionnaire to elicit responses from the respondents. This was triggered by the fact that the respondents were scattered across the country. Five research questions were raised for the proper investigation of this study. From the findings of the study, the researchers found that the majority of Nigerian students used AI and that AI has positive impacts on the educational performance of the Nigerian students. It was also found that Nigerian students have training on the use of AI for educational purposes and that they are more familiar with Snapchat AI and Chat GPT.

The study also left a gap to be filled. This is prompted by the fact that the research did not investigate whether or not tertiary institutions in Nigeria were responsible for

the training of the students on the use of AI and whether the training was formal or informal. Conclusively, AI is useful to students in the sense that it enhances their knowledge of their courses, improves their learning and speaking skills, and helps them to have a quick understanding of their course by way of simplifying technical aspects of their courses. The researchers therefore recommend as follows: Nigerian tertiary institutions should formally train students as well as teachers on the use of AI for academic purposes so that they can understand the ethical implications of the use of AI. The use of AI should be fully integrated into Nigerian tertiary institutions' curricula.

It is believed that AI has the potential to revolutionize teaching and learning in various ways, transforming the education sector. Here are some future perspectives that illustrate the potential of AI to transform education, making it more accessible, personalized, and effective: personalized learning, intelligent tutoring systems, automated grading, enhanced accessibility, virtual learning environments, teacher support, natural language processing, adaptive assessments, and learning analytics, as well as human-AI collaboration, content creation, social learning, gamification, career guidance, and lifelong learning.

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