

COGNITIVE CHALLENGES FACING THE INTRODUCTION OF ARTIFICIAL INTELLIGENCE (AI) IN SECONDARY SCHOOLS IN AWGU EDUCATION ZONE, ENUGU STATE

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Abstract

The researcher examined; cognitive challenges facing the introduction of Artificial intelligence in Secondary Schools in Awgu Education Zone. Two research questions guided the study. Descriptive survey research design was adopted for the study. The population for the study was 1,911 students in the 54 public secondary schools in Awgu Education Zone. The instrument for data collection was a researcher developed questionnaire, titled; Cognitive Challenges Facing the Introduction of AI Questionnaire (CCFIAIQ). Three experts, one from the Department of Mathematics and Computer Education and two from the Department of Educational management all in the Faculty of Education, Enugu State University of Science and Technology (ESUT), Enugu, undertook the validation of the instrument. To assess the internal consistency of the instrument, the researcher applied the Cronbach alpha reliability method, producing value of. 0.91, confirming the reliability of the instrument. The research questions were answered using mean scores and standard deviations. The findings of the study showed that AI tools have negative influence on their academic skills and that over reliance on AI can lead to decrease in critical thinking skills, problem solving skills, and creativity, biased assumptions, privacy concerns, inequality and discrimination. Based on the findings, the researcher recommended that students should set a time boundary for the usage of AI tools, while in the learning process they may allocate limited time for their activities or assignments and ensure that there shouldn't be occurrence of over-reliance and it can be used as complementary tools rather than completely replacing traditional learning methods.

Keywords: Cognitive, AI, challenge, secondary school

Introduction

Artificial intelligence (AI) has become an integral part of daily life, streamlining everything from search queries to complex decision-making. While AI tools offer convenience and efficiency, they also raise concerns about cognitive offloading the process of delegating cognitive tasks to external aids (Gerlich, 2025). As reliance on AI grows, experts warn that it could diminish critical-thinking skills and alter fundamental cognitive processes (Yusuf and Afolabi (2020). It is not about avoiding its use entirely; the incorporation of AI is essential for the advancement of our societies. (In fact, as will be seen later, it has been shown that a moderate use of AI can have a positive cognitive impact.). Gerlich (2025) suggested that individuals who rely heavily on automated tools may struggle with independent reasoning. One contributing factor is cognitive offloading, where AI users engage less in deep, reflective thinking and instead prefer quick AI-generated solutions. According to Yusuf and Afolabi (2020), many secondary school teachers in Nigeria are highly depending on AI beyond basic technological tools such as projectors and PowerPoint. Similarly, Olanrewaju et al. (2021) found that although teachers have a general awareness of digital technologies, their knowledge of AI-based applications such as machine learning-powered assessment tools or virtual teaching assistants remains vague and underdeveloped and this leads to a negative cognitive attribute from both learners and teachers.

Cognitive challenges refer to difficulties in processing information, thinking clearly, learning new concepts, or making decision effectively. They can occur in everyday life, educational settings, or professional environment and vary in severity from mild forgetfulness to significant impairments that interfere with day functioning. These challenges are not uncommon and can affect anyone at different stages of life. Gao (2022) found a concerning trend where users exhibit an over-reliance on AI dialogue systems, often accepting their generated outputs, AI hallucination, without validation. This overdependence is exacerbated by cognitive biases where judgments deviate from rationality and heuristics or the use of mental shortcuts, leading to uncritical acceptance of AI-generated information. Grassini (2023) identified that algorithmic biases are frequently a result of AI systems being trained on datasets with inherent prejudices, causing users to regard these biased outputs as objective mistakenly. This misplaced trust can skew analysis and interpretation, further entrenching the issue. Cognitive challenges ranging from over dependency, plagiarism, processing speed delay and others.

Over-dependency on AI technology is a critical cognitive challenge facing the introduction of AI in secondary schools in Enugu State, Nigeria. This issue can have far-reaching implications on students' learning outcomes, creativity, and critical thinking skills. AI outputs can cause misclassification and misinterpretation. The generation of such unvalidated content by AI systems poses a significant risk, potentially culminating in research misconduct, including plagiarism, fabrication, and falsification. The utilization of AI tools to compose a paper in any academic or professional context constitutes plagiarism (Gao et al., 2022). Studies show that the increasing prevalence of journals lacking rigorous quality controls has led to concerns about the potential surge of AI-generated articles in the scientific community, with notable plagiarism detection tools failing to identify infringements effectively (Dehouche, 2021; Francke & Bennett, 2019). De Angelis *et al.* (2023) found that the rise of journals that neglect essential quality controls, like verifying for plagiarism or ensuring ethical standards, might result in a significant influx of AI-generated articles within the scientific realm. Such a trend could gravely undermine the credibility of scientific studies and tarnish the prestige of scholarly publications. Khalil and Er (2023) have reported that popular plagiarism detection tools, such as Turnitin and iThenticate, show a significant limitation in identifying plagiarism in essays that are based on existing literature. Concerningly, their studies reveal that these tools could only detect plagiarism in less than 15% of cases. This low detection rate raises serious concerns about the potential misuse of these platforms by students for academic purposes. It also highlights a critical issue regarding the lack of transparency in the algorithms that drive these plagiarism detection procedures (Ventayen, 2023).

The issue of a lack of transparency in algorithm-driven procedures in the realm of social-legal contributions, often referred to as "black-boxing" (Carvalho et al., 2019). According to Carvalho et al. (2019), such transparency is pivotal for enhancing understanding of AI dialogue systems, laying a solid foundation for the challenges and advantages of algorithmic decisions, and ensuring that decision-making processes are both accountable and fair. Additionally, it is crucial to scrutinize how information is accessed online, especially on digital platforms. Beck (2019) explored the intricate dimensions of media ethics, identifying similarities to online communication ethics. The core of this discourse revolves around practices valuing truth. This includes shedding light on the decision-making behind content selection, validating the genuineness of content, understanding authorship, and pinpointing deliberate misinformation, including algorithmic biases. Meanwhile, Dergaa et al. (2023) argued the importance of data transparency in AI systems within research and education. The present study therefore aimed at identifying the

influence of over dependency as a critical challenge facing the introduction of AI Technology in Secondary School in Enugu State.

Statement of the problem

The integration of artificial intelligence (AI) tools in classroom instruction has gained global recognition for its potential to enhance teaching effectiveness and improve student learning outcomes. These tools, including adaptive learning systems, intelligent tutoring platforms, and automated assessment systems, offer opportunities to personalize instruction, reduce teacher workload, and foster active student engagement. However, in many secondary schools in Awgu Education Zone, Enugu State, Nigeria, the adoption of AI tools is rapidly taking over normal classroom teaching and learning. Many students no longer use their initiatives to solve problems without using AI in classroom assignment, class examinations and even normal classroom question and answer sections. The limited research on the integration of AI tools in secondary schools in Nigeria, and Enugu State in particular, further compounds the problem. While global studies highlight the benefits of AI in education, few studies explore its adoption in the Nigerian context, where socio-economic, cultural, and infrastructural factors play a significant role in shaping technology integration. This study seeks to address this gap by examining cognitive challenges facing the introduction of AI technology in Secondary Schools in Enugu State.

Purpose of the Study

The main purpose of this study was to identify cognitive challenges facing the introduction of AI in secondary schools in Enugu State.

Specifically, the study seeks to identify:

1. cognitive challenge facing the introduction of AI in Secondary Schools in Enugu State.
2. Ways of curbing the issue of cognitive challenges of AI in secondary school students in Enugu State.

Research Question

The following research questions are developed to guide the study.

1. What are the Cognitive challenges facing the introduction of AI in Secondary Schools in Enugu State?
2. What ways can the cognitive challenges facing AI in Secondary Schools can be curbed in Enugu State?

Methods

The research design adopted for this study was a survey design. This was used to elicit different opinion of people on issues of investigation. According to Nworgu (2015), descriptive survey is a research design where a group of people or items is studied by collecting and analyzing data from only a few people or items considered being the representative of the entire group. This research ascertained the cognitive challenges facing the introduction of artificial intelligence in Awgu Education Zone. The choice of survey design was because the study established the influence of the independent variables and the dependent variable. The study was conducted in Awgu Education Zone of Enugu State. Enugu State has six Education Zones. The Zones are: Enugu, Agbani, Udi, Awgu, ObolloAfor and Nsukka. Awgu Education Zone consist of three Local Government Areas (LGA) namely Awgu, Oji-River and Aninri L.G.A of Enugu State. The area is predominantly urban in nature with basic modern facilities such as good roads and electricity. Most people living in Awgu Education Zone are civil servants, lecturers, teachers, students and traders and a few are farmers. Thus, they value education. There are 54 public senior secondary schools in the zone. Awgu Education Zone is chosen because,

it is made up of reasonable number of the school types (Boys schools, Girls schools and Co-Educational schools) which will enable the researcher draw a homogeneous sample for the study. The population of the study was made up of the entire Senior Secondary two (SSII) Computer Studies Students totaling 1,911 students in the 54 public secondary schools in Awgu Education Zone. There are twenty-six schools in Awgu, Seventeen (17) schools in Enugu Aninri and eleven (11) schools in Oji-River Local Government Area, Enugu State. The sample comprises 384 (20%) SSII Computer Studies Secondary students' who were drawn from 12 out of 54 public schools in Awgu Education Zone, using simple random sampling technique (Balloting without replacement). These schools include; three girls (only) schools, three boys (only) schools and six co-educational schools. In which four schools were sampled from each local government area of the Zone using simple random sampling (Balloting without replacement) and purposive sampling. The only boys (only) school in Awgu and girls (only) school in Aninri were purposively sampled. The reliability co-efficient of the questionnaires was established by administering the questionnaire to 25 students randomly sampled in one of the secondary schools in Udi Education Zone in Enugu State which is outside the research area of the study and has homogenous culture with the research area, Cronbach alpha was used to determine the reliability of the instruments because the items were psychologically scored. The reliability indices was found to be, 0.91 for the Questionnaire which shows that the instruments are reliable for the study. This reliability co-efficient was considered adequate for the internal consistency of the instrument. An instrument is considered reliable if it lies between 0 and 1 and the closer the calculated reliability co-efficient is to zero, the less reliable the instrument and the closer it is to 1, the more reliable the instrument (Uzoagulu in Okoye, 2015). Research questions 1-2 was answered using mean and standard deviation.. A mean score of 2.50 and above was classified as Agree (A) while mean score of less than 2.50 was classified as Disagree (D). For the purpose of analysis of data, responses of strongly Agree (SA) and Agree were collapsed into Agree (A) while responses of Disagree (D) and Strongly disagree (SD) were collapsed into Disagree (D).

Results

Research Question One: What are the cognitive challenges facing the introduction of AI in Secondary Schools in Awgu Education Zone?

Table I: Mean ratings on the cognitive challenges facing the introduction of AI in Secondary Schools

N=384									
S/N	Cognitive challenges facing the introduction of AI in Secondary Schools are as follows:	SA	A	D	SD	Σfx	$\bar{X}$	SD	Decision
1	Over-reliance on AI-generated content	200	100	40	44	1224	3.18	0.82	Agree
2	Lack of critical thinking and problem-solving skills	160	150	50	24	1214	3.16	0.87	Disagree
3	Decreased student autonomy and agency	220	80	50	34	1254	3.26	0.52	Agree
4	Diminished creativity and originality/plagiarism	180	100	58	46	1182	3.07	0.84	Agree
5	Dependence on AI-driven learning platforms.	137	92	77	78	1056	2.75	0.52	Agree

6	Potential biases in AI-driven assessment.	100	100	100	84	984	2.56	0.57	Agree
7	Risk of AI-generated misinformation	150	150	30	54	1224	3.18	0.41	Agree
8	Neglect of higher-order thinking skills	300	70	5	9	1429	3.72	0.86	Agree
9	Neglect of emotional intelligence and empathy	150	100	50	84	1084	2.82	0.40	Agree
10	Focus on procedural knowledge over conceptual understanding	180	20	50	134	1014	2.64	0.71	Agree
Grand Mean							3.03	0.69	Agree

Result on Table 1 are sample data on the cognitive challenges facing the introduction of AI in secondary schools in Awgu Education Zone . Table 1 indicates that there are high cognitive challenges facing the introduction of AI in secondary schools in Awgu Education Zone, nine out ten. These items are numbered 1,3,4,5,6,7,8,9 and 10 with mean score ranging from 2.96 – 3.88 and standard deviation from 0.40 to 0.69. On the other hand, the overall mean ranged from 1.64 to 3.56 with a grand mean of 3.03 and a standard deviation of 0.69. All these indicate that all items in this cluster are attributes to cognitive challenges facing the introduction of AI in secondary schools in Awgu Education Zone . Finally, the overall grand mean of 3.03, implies that AI when not well used, can cause a serious academic concern in Secondary Schools in Awgu Education Zone.

Research Question Two: What ways can the cognitive challenges facing AI in Secondary Schools can be curbed in Enugu State? **Table 2: Mean rating on the ways AI cognitive challenges can be curbed insecondary school students be curbed in Enugu State**
N=384

S/N	AI cognitive challenges can be curbed insecondary school students by:	SA	A	D	SD	$\sum fx$	$\bar{X}$	SD	Decision
11	Pair students with mentors who can guide and support them in developing independence and problem-solving skills.	137	92	77	78	1056	2.75	0.52	Agree
12	Teach students self-management skills to help them regulate their behavior, set goals, and achieve independence.	100	100	100	84	984	2.56	0.57	Agree
13	Help students identify and change negative thought patterns that contribute to over-dependency.	150	150	30	54	1164	3.03	0.41	Agree
14	Use cognitive behaviour therapy to address underlying issues that may be contributing to over-dependency.	300	70	5	9	1429	3.72	0.86	Agree

15	Foster a learning environment that encourages students to take ownership of their learning and develop independent study habits.	150	100	50	84	1084	2.82	0.40	Agree
16	Teach students problem-solving skills to help them become more self-sufficient and less dependent on others.	180	20	50	134	1014	2.64	0.71	Agree
Grand Mean							2.92	0.78	Agree

Table 2 shows sample data on ways of curbing cognitive challenges facing the introduction of AI in Awgu Education Zone. Table 2 indicates that there are still many ways of curbing the issue of AI cognitive issues in all the six identified. The items are numbered 11,12,13,14,15 and 16 with mean score ranging from 2.75 to 3.68. On the other hand, the overall mean ranged from 1.64 to 3.56 with a grand mean of 2.92 and a standard deviation of 0.78. All these indicate that all items in this cluster are attributes to ways to curbed cognitive errors among secondary school students in Enugu State. Finally, the overall grand mean of 2.92, implies that the respondents agreed that the above are ways that cognitive challenges can be curbed in Awgu Education Zone.

Discussion

Findings in table 1 sought to find out cognitive challenges facing the introduction of AI in secondary schools in Awgu Education Zone. The result of the analysis of research question 1 showed that the respondents agreed that Over-reliance on AI-generated content, lack of critical thinking and problem-solving skills, decreased student autonomy and agency, diminished creativity and originality, dependence on AI-driven learning platforms, risk of AI-generated misinformation, neglect of higher-order thinking skills, Neglect of emotional intelligence and empathy and focus on procedural knowledge over conceptual understanding. This is in line with the study of Abd Rahman, Rodzi, Razali, Mohamad, Nazri, & Al- Sharqi (2023) who opined that over-reliance of AI tools may lead to concern about ethical issues such as privacy of the students these AI tools may collect the data of the students without their consent and knowledge which can be possible to misuse their sensitive information, therefore addressing ethical concerns should not be ignoring the view to safeguards students well-being and fundamental rights.

Findings in table 2 shows sample data on AI cognitive challenges among secondary school students be curbed in Enugu State. Table 2 indicates that teachers should teach students self-management skills to help them regulate their behavior, set goals, and achieve independence, help students identify and change negative thought patterns that contribute to over-dependency, foster a learning environment that encourages students to take ownership of their learning and develop independent study habits and teach students problem-solving skills to help them become more self-sufficient and less dependent on others. This has a link with the work of Nguyen (2023) who opined that AI tools provides vast amount of information to students which can lead to the students use to copy and paste the data without understanding the contents or the topic, this attitude of the students makes them lethargic and inactiveness moreover it will lead to hindrance for cognitive development of the students which is vital for academic settings.

Educational Implications of the Study

The findings of this study have significant educational implications for teachers, school administrators, curriculum planners, policymakers, and other stakeholders involved in secondary education, particularly within the Awgu Education Zone. The identification of

cognitive challenges such as over-reliance on AI-generated content, reduced critical thinking, diminished creativity, and weakened problem-solving skills indicates the need for a careful and guided integration of Artificial Intelligence into classroom practices. Teachers must therefore adopt instructional approaches that encourage students to think independently, question information, and apply knowledge conceptually rather than relying excessively on AI tools for answers and academic tasks. Furthermore, the study implies that teachers require continuous professional development to enable them to effectively manage the cognitive implications of AI usage among students. Educators should be equipped with the pedagogical skills needed to balance traditional teaching methods with emerging technologies, ensuring that AI serves as a supportive tool rather than a replacement for cognitive engagement. This also calls for instructional strategies that promote learner autonomy, originality, emotional intelligence, and reflective thinking, which are essential for holistic student development.

The study also has implications for curriculum design and implementation. Curriculum developers should incorporate components that strengthen digital literacy, self-regulation, and higher-order thinking skills within secondary school curricula. Such integration would help students understand the appropriate use of AI technologies, develop the ability to evaluate information critically, and avoid the risks of misinformation and intellectual passivity. In addition, school administrators and policymakers should formulate clear guidelines and ethical frameworks regulating the use of AI in schools, with particular attention to student privacy, equity, and cognitive well-being. Parents and guardians are equally implicated, as they must collaborate with schools to monitor and guide students' use of AI tools outside the classroom, thereby reinforcing responsible learning habits and cognitive independence.

Contribution to Knowledge

This study contributes meaningfully to the existing body of knowledge on educational technology and cognitive development by empirically examining the cognitive challenges associated with the introduction of Artificial Intelligence in secondary schools. While many existing studies emphasize the instructional benefits of AI, this research provides a critical perspective by highlighting its potential negative cognitive consequences, particularly in relation to critical thinking, creativity, autonomy, and problem-solving abilities among students. Additionally, the study contributes to knowledge by situating the discourse on AI within a localized Nigerian educational context, specifically the Awgu Education Zone. This contextual focus fills a notable gap in the literature, as limited empirical research has explored AI-related cognitive challenges in secondary schools within developing educational systems. By doing so, the study enhances the relevance of global discussions on AI in education to local realities and policy considerations. Moreover, the study advances theoretical understanding by establishing a clear link between AI usage and key cognitive constructs such as higher-order thinking skills, emotional intelligence, learner autonomy, and conceptual understanding. The practical strategies suggested for curbing cognitive over-dependence on AI further extend the knowledge base by offering actionable insights for educators, policymakers, and researchers. Consequently, the study provides a valuable reference for future research and practice, contributing to informed decision-making on the responsible and balanced integration of Artificial Intelligence in secondary school education.

Conclusion

AI tools can be of both positive and negative cognitive influence on student's academic and real-life performance, ultimately discussed on the negative impacts on students. Artificial Intelligence tools has the potential benefit such as personalized learning experiences,

improves teaching-learning efficiency, and provides valuable resources. Correspondingly, it has potential negative consequences such as overreliance, hindrance to critical thinking skills, problem solving skills, and creativity, biased assumptions, privacy concerns, inequality and discrimination. Therefore, it is crucial to address these negative pitfalls on educators, parents and policymakers to be aware about limitations of these tools and establish a proper regulations and guidelines to strike a healthy balance of utilizing AI tools without compromising the traditional method and ensure promoting a well-rounded development in both academic and real-life performance, by following the strategies which is discussed above we can create a healthy balanced and impactful learning environment for our future generations.

Recommendations

The following recommendations were made from the findings:

1. Students should set a time boundary for the usage of AI tools, while in the learning may allocate limited time for their activities or assignments and ensure that there shouldn't be occurrence of over-reliance and it can be using as complementary tools rather than completely replacing traditional learning methods.
2. They should control themselves by spending their energy, time, interest, and knowledge on these tools in order to protect themselves from over-reliance.
3. It is essential for educators to actively monitor the students' engagement in learning process and assess their progress when they utilizing AI tools.
4. Educators should recommend the students to utilize the AI tools as complementary support rather than completely removing traditional learning methods.

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