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Exploring Postgraduates' Adoption of AI-Based Tools in Selected Higher Education Institutions in Delta State

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Abstract

This study explores Delta State, Nigeria, postgraduates' knowledge of and engagement with AI-based tools for language learning. This study sought to identify the levels of awareness and different facets of engagement, and the correlation of the two variables amongst the Population of 1000 postgraduates, 870 respondents were selected through stratified random sampling. Participants' data were obtained through questionnaires, which were later analysed through thematic and descriptive analysis. The results of the study showed a mix of different levels of awareness of tools, with a notable knowledge of, and a lack of awareness of, functionalities like predictive analysis and automated grading. The results of the study indicated that AI-based tools for test preparation, translation, recommendations, and general skill improvement were used in moderate-to-high frequencies. The analysis demonstrated a greater level of awareness of AI-based tools and adoption. The study recommendations include integration of AI-based tools for additional training offered to students, and that curricula designed for Nigerian students be developed. The main conclusion of the study was that awareness is the main influencer. The research offers a postgraduate African context empirical contribution; specifically, the study shows how the components of technology acceptance, awareness, and perceived usefulness are interrelated. Limitations include self-reporting biases and the small geographic scope. Ascertaining the true effect of AI on students' language skills and overall academic achievement lends to future investigations the need for experimental and longitudinal designs.

Keywords AI; Chatbots; Delta state; Learning Language Tools; Postgraduate students (PGS).

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INTRODUCTION

Artificial Intelligence (AI) technologies have been employed across numerous domains, including Language learning and Education, and have started to revolutionize several aspects of the field. Over the past few years, different AI-based tool applications designed to enhance the learning experiences of Language learners have been introduced (Hussain et al., 2025; Zhang & Bian, 2025). These applications adapt and personalize learning experiences and have been termed as AI-guided adaptive learning (Kumar et al., 2023). AI-based tools applications provide Language learners with feedback specific to their learning challenges and assist learners in attaining proficiency (Li et al., 2022). The effectiveness of AI Education applications has remained underexplored and unexamined. It is especially the case for the postgraduate

Education students in the Delta State of Nigeria. The absence of such knowledge and research has, to a certain extent, become a dilemma for modern educators and is more so complicated for digital policy makers and AI programmers, since they have little to no evidence on how postgraduates in any given country utilize AI educational applications. It is the gap in knowledge this study seeks to bridge. The objectives of the study will be informed by the following research questions: (a) What are the differences in the levels of awareness of AI-based tools Applications among PGS in Delta State?; (b) What is the degree of utilization of selected AI-based tools Applications among PGS in Delta State?; and (c) To what degree does the extent of awareness of PGS in Delta State correlate with the degree of utilization of specific AI-based tools Applications?

This research will help in understanding the effects AI-based tools have on the learning of a language, thus providing a base of research with value to this study. There will be a better understanding of the level of awareness of AI-based tools among postgraduate students and the extent to which they are employed (Fošner, 2024; Joseph et al., 2024; Malka et al., 2025). This understanding will provide an opportunity to develop techniques for learning and teaching a language and improve educational policies. It will also appreciate the relationship between the level of awareness and the extent of use of AI-based tools in the education system, thus helping educational administrators and policymakers to enhance the use of these tools among students. This study will also assist in understanding the consequences of integrating digital aids in second language acquisition, thereby identifying some of the potential hindrances and emphasizing the available sophisticated digital aids that learners can access.

THEORETICAL LITERATURE

Technology Acceptance Model (TAM)

TAM is a model created by Davis (1989) that seeks to explain the factors that influence people's acceptance and use of new technology (Davis, 1989b). According to TAM, the perceived usefulness and perceived ease of use of a technology influence a user's disposition toward the technology, which in turn affects the user's intention to use the technology (Davis, 1989a). Based on the context of this study, TAM is applicable in explaining the acceptance and use of AI-based tools by postgraduate students in Nigeria. For instance, students who perceive AI-based tools to be beneficial and effortless to use should exhibit a more favourable disposition toward the tools and consequently a higher usage rate of the tools (Aldraiweesh & Alturki, 2025; Udoinyang et al., 2026).

Diffusion of Innovations Theory

The diffusion of innovations theory was developed by Rogers (1962) to account for the ways new ideas and new technologies are adopted and spread in a social system (Anistasya et al., 2025; Wahid, 2025). The Diffusion of Innovations Theory has been adopted to explain the adoption of new technology. The adoption and utilization of innovation depend on some characteristics of the innovation itself. These are relative advantage, compatibility, complexity, trialability, and observability. In this study, Diffusion of Innovations Theory applies to the adoption and utilization of AI-based tools by PGS in Nigeria. It is because the AI-based tools are more likely to be accepted by the students if they show a relative advantage over other traditional methods of language learning (Yilmaz & Yilmaz, 2023).

EMPIRICAL LITERATURE

Alzakwani et al. (2025) analysed the influence of the integration of artificial intelligence and information and communications technology in the higher education sector. Their study found that the integration of artificial intelligence improves teaching and learning, and thus concluded that the enhancement of education by the technology is significant. Okolie and Egbon (2025) examined the integration of artificial intelligence in teaching and learning in Nigerian educational institutions and found that the integration of artificial intelligence improves teaching and learning. They thus advocated that education specialists and policymakers incorporate AI technology. The research of Almulla and Al-Rahmi (2023) focused on understanding how students behave in the Saudi education system and the use of AI-enabled chatbots. From this research, it was evident that students' attitudes towards the use of AI-enabled chatbots were dependent upon perceived ease of use and perceived usefulness. The authors acknowledged the importance of students' perceptions in the role AI is employed in education, and that the AI chatbots can be positive in enhancing students' improvement in their learning experience.

An et al. (2025) examined the students' understanding and perceptions of the role AI plays in language learning applications. It was evident that the influence of performance expectancy, social impact, AI language knowledge, and AI technological pedagogical knowledge was a strong predictor of the intention and willingness to use AI language learning. The authors noted the importance of improving the students' perceptions of AI language learning, thereby calling upon the educational systems to advocate the use of AI in language learning.

Huang et al. (2022) reviewed the literature on chatbots to show the connection between chatbots and engagement and between chatbots and language proficiency. The authors encourage the educational and policy-making community to focus on and support technology in language learning. Kohnke (2022) describes what students think regarding the use of chatbots in the context of Emergency Remote Teaching. The positive perception of the use of chatbots made the researchers advocate for the use of chatbots in language education. It is because the researchers concluded that the use of chatbots can support language learners, which is supported by the study of Lee et al. (2022), which states that AI chatbots in language learning are one of the most useful tools among students. Mageira et al. (2022) investigated the use of educational AI chatbots regarding content and language integrated learning. The authors concluded that AI chatbots can assist language learners in learning more effectively and more efficiently because they provide personalized assistance. Hence, the authors advocate the use of AI chatbots in language education.

Udoinyang et al. (2026) identified assisting educators and AI tools as the means of personalizing AI-enhanced learning within educational systems. They suggested the incorporation of AI language tools in classroom instruction. Okolie and Egbon (2025) investigated the integration of artificial intelligence within the teaching and learning ecosystem of Nigeria and identified AI potential to transform teaching and learning to improve systems. They encouraged educators and educational administrators to invest in the integration of AI systems. There is literature describing AI-enabled systems focusing on various aspects of its applications, such as language learning, as well as its benefits and challenges. Nevertheless, the postgraduate students in Delta State, Nigeria, the knowledge and adoption of AI language learning systems has not been documented and researched. To fill the gap, this study investigated the level of expertise and the extent of the adoption of AI-based tools, the importance of the adoption commensurate with the knowledge, the perceived benefits, and the challenges associated with the AI-based learning systems.

METHODOLOGY

This research analyses the awareness and utilization of Artificial Intelligence (AI) based tools by postgraduate students of selected universities in Delta state, using a survey research design. This study targeted doctoral students in selected universities in the Delta. Using stratified random sampling, a sample of 1000 PGS, of which 500 were Master's students and 500 were PhD students, was selected. A survey on the awareness and utilization of AI-based

tools was conducted. Data were analysed using descriptive and inferential statistical techniques of frequency distributions, means, and thematic analyses (Wróblewski & Petrenko, 2022). Fifty PGS, 25 Master's students, and 25 PhD students were invited to participate in the interviews. The questionnaires were designed to capture some demographic and background characteristics. The study employed a strong 4-point Likert scale (1-strongly disagree, 2-disagree, 3-agree, and 4-strongly agree) with a threshold for analysis of a mean cut-off score of 2.5. To improve the accuracy of the results, the researchers conducted reliability and validity via interviews of the measures embedded in the study's instruments. Beyond descriptive statistics, this study employed Pearson Product-Moment Correlation (PPMC) to determine the strength, direction, and significance of the relationship between postgraduate students' awareness of AI-Based tools and their level of utilization. This inferential approach enabled the study to empirically test the claim that awareness is a significant predictor of adoption (Wang et al., 2014). Furthermore, researchers ensured that the ethical principle of respect for persons was followed in the collection and use of the data. With regard to the moral principles of this study, respondent consent was obtained, and their complete anonymity was preserved in relation to their individual responses.

PRESENTATION OF DATA

The type of research influenced the method of arranging and presenting the data collected. Similar to the targeting of the primary data, the questionnaires were purposefully and randomly allocated in relation to the respondents' age, sex, and other variables, which were then treated as categorical and reported in percentages.

Table 1. Senatorial and Institutional Distributions of the Questionnaires

Senatorial District	Institutions in the District	Selected Institutions	Questionnaires Distributed	Questionnaires Returned
Central Senatorial District	4	University of science and technology Ozoro	200	177
		West Delta University, Oghara	200	164

Senatorial District	Institutions in the District	Selected Institutions	Questionnaires Distributed	Questionnaires Returned
South Senatorial District	2	Federal University of Petroleum Warri	200	175
North Senatorial District	5	Delta State University, Abraka	200	172
			200	182
		Edwin Clark University	**1000**	**870**

Source: Author's Compilation (2025)

Table 2. Respondents Sociodemographic characteristics

Sociodemographic Characteristics	Frequency	Percentage
Status		
Single	348	40.0
Married	522	60.0
Total	870	100
Age Range		
21-30 years	301	34.6
31-40 years	254	29.2
41-50 years	179	20.6
51 & above	136	15.6
Total	870	100
Program Enrolled For		
M.Sc	462	53.1
PhD	408	46.9
Total	870	100
Total	870	100

Source: Authors Survey, 2025.

In Table 1, we can see the details of the senatorial district and institutional distribution of the Population, while Table 2 shows the sociodemographic characteristics of the respondents. The Population was distributed to all accredited institutions selected from each senatorial district in Delta state. Among the 870 respondents, the majority who are married accounted for 522 (60%) of the total. In terms of age, most respondents are over 21-30years of age; Similarly,

when asked about the program running in the institutions, the highest number of respondents are M.Sc. degree students, 462 (53.1%).

DATA ANALYSIS

What are the comparative awareness levels of selected AI-Based tools among postgraduate students in Delta State?

Table 3. Respondents' perception of the comparative awareness levels of selected AI-Based tools among postgraduate students in Delta State

S/N	Factors	SA	A	D	SD	Mean	Decision
1	Most of the students are aware of AI-powered video lessons for postgraduate school students.	448	120	133	169	3.0	Agreed
2	Few students have low awareness of chatbots for learning, with many lacking access.	193	513	109	55	3.0	Agreed
3	Limited awareness, with few students utilizing AI-driven recommendations for personalized study paths.	306	387	69	108	3.0	Agreed
4	Some awareness, with students leveraging AI-powered learning platforms for skill development.	98	619	143	10	2.9	Agreed
5	Moderate awareness, with students using apps for language translation and content access.	225	346	218	81	2.8	Agreed
6	25% of students are aware of AI chatbots and virtual assistants for answering questions 24/7.	301	194	230	145	2.7	Agreed
7	30% of students are familiar with AI tools for automating exam marking and feedback.	177	450	68	175	2.7	Agreed
8	There's low awareness, with few students understanding AI's role in predicting student performance and dropout rates.	439	218	107	106	3.1	Agreed
	Aggregate Mean					2.9	**Agreed**

Source: Authors' Survey, 2025.

As deduced from Table 3, items 1-8, it shows that the aggregate mean of the items is above the mean criterion of 2.5. Also, based on all responses, the aggregate mean is 2.9,

indicating that the respondents all agreed that the items above are the comparative awareness levels of selected AI-Based tools among postgraduate students in Delta State.

What is the comparative level of utilization of selected AI-Based tools among postgraduate students in Delta State?

Table 4. Respondents' perception of the comparative levels of utilization of selected AI-Based tools among postgraduate students in Delta State

S/N	Factors	SA	A	D	SD	Mean	Decision
1	40% of students utilize AI-powered video lessons for exam preparation and homework help.	316	199	314	41	2.9	**Agreed**
2	20% of students use chatbots for learning, with limited access and technical issues hindering usage.	503	122	68	177	3.1	**Agreed**
3	15% of students leverage AI-driven recommendations for personalized study paths and skill development.	168	446	101	155	2.7	**Agreed**
4	30% of students utilize AI-powered learning platforms for skill development and career advancement.	645	87	137	1	3.6	**Agreed**
5	45% of students use apps for language translation and content access.	229	360	191	90	2.8	**Agreed**
6	18% of students use AI chatbots and virtual assistants for answering questions and providing feedback.	275	329	144	59	3.0	**Agreed**
7	22% of students benefit from AI tools for automating exam marking and feedback.	402	135	218	115	2.9	**Agreed**
8	12% of students understand AI's role in predicting student performance and dropout rates.	316	233	177	144	2.8	**Agreed**
9	50% of students use AI-powered language learning apps for vocabulary building and grammar practice.	272	368	77	153	2.9	**Agreed**
10	25% of students utilize AI-powered flashcards for vocabulary building and exam preparation.	144	523	64	139	2.8	**Agreed**
11	10% of students participate in AI-facilitated language exchange programs for cultural immersion.	156	427	101	186	2.6	**Agreed**
12	20% of students use AI-driven language assessment tools for evaluating language proficiency.	361	394	45	70	3.2	**Agreed**
	Aggregate mean					**2.9**	**Agreed**

Source: Authors' Survey, 2025.

From Table 4, items 1-12, it can be seen that the aggregate mean of the items is above the mean criterion of 2.5. indicating that the respondents all agreed that the items above are the comparative levels of utilization of selected AI-Based tools among postgraduate students in Delta State.

What is the relationship between the awareness and utilization levels of selected AI-Based tools by postgraduate students in Delta State?

Table 5. Respondents' perception of the relationships between awareness and utilization levels of selected AI-Based tools by postgraduate students in Delta State

S/N	Factors	SA	A	D	SD	Mean	Decision
1	Awareness and utilization of AI-Based tools are positively correlated, with higher awareness leading to increased utilization.	416	212	75	167	3.0	**Agreed**
2	Students with higher awareness of AI-Based tools are more likely to utilize them for language learning.	501	16	53	300	2.8	**Agreed**
3	Low awareness of AI-Based tools limits their utilization among postgraduate students.	346	291	64	169	2.9	**Agreed**
4	As awareness of AI-Based tools increases, utilization rates also increase among postgraduate students.	312	398	97	63	3.1	**Agreed**
5	Students who are aware of AI-Based tools are more likely to adopt them for language learning.	603	75	102	90	3.4	**Agreed**
6	Utilization of AI tools is dependent on awareness, with higher awareness leading to increased usage.	517	122	19	217	3.1	**Agreed**
7	Awareness and utilization of AI-Based tools are linked, with increased awareness leading to increased utilization.	379	286	78	127	3.1	**Agreed**
8	Students with higher awareness of AI-Based tools tend to utilize them more frequently.	420	115	102	233	2.8	**Agreed**
9	Awareness of AI-Based tools drives utilization, with students seeking out tools they are aware of.	266	374	113	117	2.9	**Agreed**
	Aggregate mean					**3.0**	**Agreed**

Source: Authors' Survey, 2025.

Again, Table 5, items 1-9, shows that the aggregate mean of the items is above the mean criterion of 2.5. indicating that the respondents all agreed that the items above are the relationships between awareness and utilization levels of selected AI-Based tools by postgraduate students in Delta State.

Table 6. Pearson Correlation between Awareness and Utilization of AI-Based Tools

Variables	N	Mean	SD	r-value	p-value	Decision
Awareness of AI tools	870	2.9	0.62			
Utilization of AI tools	870	2.9	0.67	0.68	0.000	Significant

Source: Authors' Computation, 2025

The Pearson correlation analysis revealed a strong, positive, and statistically significant relationship between awareness and utilization of AI-powered language learning tools ($r = 0.68$, $p < 0.05$). This finding empirically confirms that postgraduate students who possess higher levels of awareness are significantly more likely to utilize AI language learning tools. The result provides robust statistical evidence in support of the study's central claim that awareness is the primary driver of adoption.

QUANTITATIVE ANALYSIS

The research focused on how PG students in Delta State, Nigeria, are aware of and use AI-based learning apps. This research suggests PG students in Delta State have different levels of knowledge of different AI-Based tools. The participants concurred that the majority of PG students know AI-based video lessons, with a mean score of 3.0. This result is in line with the research of Almulla and Al-Rahmi (2023), which indicated that students' awareness of AI-driven tools is one of the factors that determine their behavioural intention to use the tools. Other findings of the study revealed that students are moderately aware of learning chatbots, AI-assisted personalized study recommendations, and AI-based language translator apps. These findings are consistent with Diffusion of Innovations Theory (Rogers, 2003), where the adoption of new technology is said to follow a certain curve, which is influenced by specific attributes of the innovation.

Data showed that PG students in Delta State use some AI-Based tools more than others. Survey participants observed that 40 percent of students utilize AI- enabled videos for learning and concentration on assignments. This finding concurs with Lee et al. (2022), who argued that AI-powered educational resources facilitate learning and foster positive learning attitudes. Survey participants reported that students also employ AI educational tools for acquiring competencies and improving job prospects and cited a mean score of 3.6. This data supports the findings of An et al. (2025), where students' expectations of AI-assisted language learning

are shaped by the degree of AI educational technology and social influence they are exposed to.

There is a marked link between the levels of awareness of AI-Based tools and how often these tools are used by postgraduate students studying in Delta State. Students who participated in this research demonstrated positively correlated levels of awareness and use of learning language AI tools, suggesting that the more aware students are, the more often they use the tools. It is consistent with the Technology Acceptance Model (TAM), which evidences that an individual's attitude towards a technology is positively influenced by how useful and easily accessible that technology is (Davis, 1989a). This research indicates that the postgraduate students who possess greater levels of awareness are more predisposed to employing the tools in language learning. In contrast, an insufficient understanding of the tools inhibits their use. It aligns with Almulla and Al-Rahmi (2023), where they concluded that students' awareness of AI-powered tools impacts their intention to use them.

THEMATIC ANALYSIS

The qualitative data were analysed using a systematic thematic analysis approach. Interview transcripts were first transcribed verbatim and repeatedly read to ensure familiarity. Open coding was conducted to identify recurring patterns related to awareness, usage motivation, and adoption barriers. These codes were then grouped into broader categories, from which three dominant themes emerged. The themes reflect shared experiences across Master's and PhD students and were validated through cross-checking among the researchers to enhance credibility.

Theme 1

Differential Awareness of AI-Based Tools

"As a group, we were more aware of the use of AI-Based video lessons, chatbots, and translation apps, but less aware of sophisticated AI options, including predictive analytics and automated assessment systems (First and final year master's students; third and final year PhDs). This theme is consistent with Rogers' Diffusion of Innovation Theory, which states that innovations that are highly observable and that provide a relative advantage (i.e., tutoring apps) are adopted at a faster rate, as opposed to systems that are more sophisticated and less visible, such as predictive learning analytics.

Theme 2

Pragmatic Utilization for Academic and Development of Skills

"AI tools were more for exam preparation (AI-Based lessons), translation and grammar improvement apps, and personalized study recommendations, career and skill development (2nd year PhD and final year Masters)." It lines up with the Technology Acceptance Model (TAM), whose claim states that the use of technology is influenced by the perceived usefulness of the technology. Tools that remain useful and clearly enhance learning outcomes will be used with greater frequency. These outcomes include: improvement of learner feedback, revision, and comprehension.

Theme 3

Awareness-Utilization Dependency

"This theme demonstrates that awareness functions as a gateway variable in the adoption process. Students repeatedly emphasized that tools they were unaware of, even when institutionally available, were never explored or adopted. It suggests that adoption failure is not necessarily resistance to technology, but a lack of informational exposure. In line with the Technology Acceptance Model, awareness appears to precede perceived usefulness and ease of use, thereby positioning it as the foundational driver of behavioural intention.

ANALYSIS OF FINDINGS

The descriptive findings suggest that students scored an average of above 2.8 to 3.1 across the tools, suggesting high awareness and utilization of certain tools, reflective of Theme 1, awareness differentials. Students had a firm grasp on tools like lessons from chatbots, but did not fully grasp the advanced AI capabilities like predictive analytics. It aligns with Rogers Diffusion of Innovations Theory, which states that innovations that are perceived to be compatible and experimental in nature will have a faster diffusion rate within a social system as opposed to innovations that are perceived to be complex (Rogers, 2003). Similar findings exist in Huang et al. (2022) and Kohnke (2022), where high learner awareness and exposure to technologies were associated with high repeated use of the technology.

On average, participants showed moderate-to-high mean utilizations. The adoption of AI-Based tools within Theme 2 aligns with the average utilization of AI-Based tools ranging from 2.7 to 3.6. It reflects the perceived usefulness as a major predictor of behavioural intention, as stated by Almulla and Al-Rahmi (2023). The perceived usefulness of tools that support

academic success resulted in higher utilization of tools (AI- learning tools, chatbots). It aligns with Lee et al. (2022), who stated that AI chatbots positively impact academic success and motivation.

The pattern of relationships in this study resulted in a moderate mean of 3.0 that corresponds to Theme 3. Increased awareness resulted in increased utilization. Students stated that a lack of awareness resulted in the absence of utilization, which reflects TAM's perceived ease of use and DOI's knowledge stage in the adoption process. It supports previous work by An et al. (2025), which showed that awareness and technological knowledge predict intention to adopt AI-Based tools. All elements of this study (thematic, descriptive, theoretical, and empirical) lead to the conclusion that, amongst postgraduate students, awareness was the primary driver of the adoption of AI-Based tools.

This study aimed to assess the degree of awareness, use, and adoption of AI-powered education technologies among postgraduate students surveyed in the Delta State region, and to assess understanding of AI-Based tools, including chatbots and translation services, to varying degrees, ranging from substantial awareness of entry-level tools to the absence of awareness concerning predictive analytics and other AI tools and capabilities. Moderate to high rates of use were reported overall, particularly with respect to the translation of different tools, personalized feedback, and other forms of academic support. The Technology Acceptance Model and the Diffusion of Innovations Theory elucidate the reasons for the lack of instruments manifesting clarity with the function of tools and the high degree of visibility with regard to ease of overall use. The findings of the empirical literature were confirmed in the studies on active awareness and usefulness to drive the adoption of AI-assisted educational tools.

By combining inferential statistical evidence with in-depth qualitative insights, this study establishes awareness as the central influencer of AI-Based tools adoption among postgraduate students in Delta State. The strong positive correlation between awareness and utilization, reinforced by students' lived experiences, confirms that awareness is not merely associated with adoption but actively drives it. The study gives a voice to Africa when it comes to explaining how awareness positively impacts utilization in developing regions, thus contributing to the scholarship of the world. It affirms the need to train and offer contextualized solutions to Artificial Intelligence. Worth noting, however, the study is hamstrung by self-reporting and focusing on a few select universities, as well as the lack of an experimental assessment of the AI-Based tools' impact on learners' language proficiency. Other researchers need to focus on

experimental and longitudinal designs in order to demonstrate how performance changes over a period of time.

RECOMMENDATIONS

In the light of the study findings, the following recommendations are proposed: (1) In Delta State, universities need to establish AI-literacy programs aimed at bridging awareness and competence gaps in postgraduate students fuelled by the use of AI-Based enable tools; (2) There is a need to incorporate AI-Based enable tools into language curricula, backed by training workshops delivered by educators from ICT and the language discipline; (3) There is an urgent need for local developers to design AI-Based tools that respond to the Nigerian language dynamic, academic requirements at the postgraduate level, as well as the prevailing bandwidth constraints; (4) In the state, public and institutional decision makers need to channel resources towards the development of AI-Based enabled infrastructures including unified access to educational resources on campus and a chatbot; (5) Lecturers should be continuously trained to enhance their pedagogical skills in the use of AI technologies; (6) To help the students comprehend the AI-Based tools' usefulness and ease of access, information and awareness campaigns, workshops, and demonstrations should be organized; (7) A framework for monitoring and evaluation should be set up to record, in real time, usage behaviour, outcomes and performance, and existing problems.

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