From Prompt to Performance: Assessing Artificial Intelligence's Role in Individualized Exam Preparation Among Undergraduate Engineering Students

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Abstract

Students in a southwestern Nigerian university use artificial intelligence (AI) tools for individualized exam preparation. Adopting a descriptive cross-sectional design grounded in the UTAUT2 framework, data were collected from 117 students across six disciplines using a structured questionnaire. Findings revealed that 90.6% of respondents use AI for academic purposes, with 72.9% employing it regularly during exam preparation. Students perceived AI as effective in simplifying complex concepts ($M=4.25$) and boosting confidence ($\beta=0.521$, $p<0.001$), with 34.7% of confidence variance explained by AI use frequency. Biomedical and Computer Engineering students showed higher adoption and confidence levels than others. The study concludes that AI tools enhance individualized exam readiness but require ethical guidelines and context-specific integration for optimal benefits.

Keywords: Artificial Intelligence, Engineering, Undergraduate, Education, Examination Preparation

1.0 Introduction

Artificial intelligence (AI) has transformed institutions, industries, and education worldwide, with ongoing advancements shaping future applications (Kamalov et al., 2023; Machucho & Ortiz, 2025; UNESCO, 2023; Granjeiro et al., 2025). In education, AI supports tasks such as summarising content, providing feedback, and exam preparation (Kerimbayev et al., 2025; Khlaif et al., 2023). Higher education has shifted from theoretical discussions of AI to its practical use, with students now interacting with intelligent systems that solve problems or integrate complex ideas alongside traditional study methods (Chan, 2023). Unlike earlier tools, many platforms are adaptive and interactive, offering explanations, reorganising material, and predicting weak knowledge areas. This shift raises important questions for academia, particularly for students in science and engineering, who face demanding problem-solving requirements (Kaputa et al., 2022). AI tools are increasingly used to create personalised learning experiences without institutional guidelines, covering activities such as lecture summarisation and essay drafting. While beneficial, these practices raise concerns about student autonomy, academic confidence, and actual exam performance as boundaries blur between algorithm-assisted and independent learning (Vieriu & Petrea, 2025). Despite global growth, few studies have explored how Nigerian undergraduates use generative AI tools (Essien et al., 2024; Yakubu et al., 2025). Limited evidence exists for discipline-specific engagement in biomedical, electrical, computer, mechanical, mechatronics, and civil engineering. As AI tools become more accessible via mobile apps and integrated platforms, it is important to understand which tools students use, how often, and with what impact. Rather than debating AI's existence, scholarship should focus on how it influences fundamental academic practices such as exam preparation (Bauer et al., 2025; Mat Yusoff et al., 2025). In contexts where oversight is minimal, researchers call for scrutiny of purpose, consistency, and quality in student AI use (Benke & Szőke, 2024). This study investigates how engineering students at a private university in southwestern Nigeria adopt AI to prepare for examinations. It focuses on five dimensions: perceived usefulness, frequency and purpose of use, impact on preparedness and confidence, and ethical or cognitive challenges related to dependence on AI. The aim is not only to assess AI tools in isolation but to situate their use within authentic academic routines, particularly during periods of high cognitive demand and time pressure. A secondary objective is to compare usage trends across engineering disciplines to identify shared patterns and unique approaches. By placing students at the centre, the study contributes to understanding how AI is reshaping undergraduate learning and assessment.

Research Aim

The aim of this study is to assess the role of Artificial Intelligence (AI) in individualized exam preparation among undergraduate Engineering students

Research Objectives

1. To identify the frequency and purpose of AI tool usage during exam preparation among engineering students.
2. To evaluate students' perceptions of how AI tools support individualized learning and study efficiency.
3. To assess the relationship between the use of AI tools and students perceived academic preparedness and confidence before exams.
4. To compare patterns of AI tool usage and perceived effectiveness across departments (Electrical, Computer, Mechanical, Civil, and Biomedical Engineering).

Research Questions

1. How frequently do undergraduate engineering students use AI tools during exam preparation, and for what academic purposes?
2. To what extent do students perceive AI tools as effective in supporting individualized learning and personalized exam revision?
3. Is there a relationship between the use of AI tools and students' perceived confidence and preparedness for examinations?
4. Are there notable differences in AI usage patterns and perceived effectiveness across engineering disciplines such as Electrical, Computer, Mechanical, Civil, and Biomedical Engineering?

Hypotheses

Null Hypothesis (H_0): There is no statistically significant relationship between the use of AI tools and students perceived exam preparedness.

Alternative Hypothesis (H_1): There is a statistically significant relationship between the use of AI tools and students perceived exam preparedness.

2.0 Literature Review

This literature review synthesizes studies to explore AI's role in individualized exam preparation by Engineering students, focusing on its effectiveness, student perceptions, challenges, and discipline-specific applications.

An Overview of AI from ChatGPT to Present Day

A major milestone in artificial intelligence (AI) came with the release of ChatGPT in November 2022. Developed by OpenAI on the GPT architecture, ChatGPT attracted millions of users for its ability to generate natural-sounding text (Mesko, 2023; Mhlanga, 2023). Its successor, GPT-4, launched in March 2023, introduced multimodal capabilities, enabling the processing of text, images, and diagrams while achieving near-human performance on several academic and professional benchmarks (Dempere et al., 2023; OpenAI, 2023a; Martínez, 2024). The success of these models spurred competition. Anthropic introduced Claude in 2023, emphasising ethical safeguards and value alignment (Anthropic, 2023). Google expanded its portfolio with Bard, later rebranded Gemini, which integrated advanced natural language and multimodal features (Imran & Almusharraf, 2024). By 2024, further diversification appeared with xAI's Grok, designed for scientific discovery and fact-checking (xAI, 2024; Murillo & Weigang, 2025), and Meta's LLaMA series, which focused on academic efficiency. In parallel, multimodal systems such as DALL·E 3 and Stable Diffusion 3 advanced image generation, while specialised AI emerged for tasks including autonomous systems, diagnostics, and code production (e.g., GitHub Copilot). By mid-2025, the AI landscape encompassed conversational models (ChatGPT, Claude, Gemini, Grok), creative AI for media generation, domain-specific tools for sectors such as healthcare and finance, and reinforcement learning systems for robotics and gaming. Alongside these innovations, ethical and regulatory debates intensified, focusing on bias, transparency, and social impact. Open-source initiatives and accessible APIs, including those from xAI, further democratised AI technology (xAI, 2024). The rapid evolution since ChatGPT's release underscores the pace of AI-driven innovation and competition. This period reflects not only technological progress but also wider societal transformation as AI becomes embedded in research, education, and professional practice.

Overview of AI in Higher Education and Engineering Applications

Artificial intelligence (AI) is reshaping higher education by improving student outcomes, streamlining administration, and enabling personalised instruction (Crompton & Burke, 2023). Globally, institutions employ tools such as chatbots, data analytics platforms, and adaptive learning systems to meet diverse learning needs (Chen et al., 2023; Labadze et al., 2023). In Nigeria, adoption has been driven by challenges such as overcrowded classrooms and limited access to quality resources (Essien et al., 2024; Yakubu et al., 2025; Ebede et al., 2023). A review of seventy-four studies from 2008 to 2022 highlighted the use of Google Classroom, Moodle, and data mining for online learning and performance prediction (Yakubu et al., 2025). While these tools enable e-learning, test automation, and affordability, widespread use remains constrained by poor electricity supply and unreliable internet (Essien et al., 2024). Globally, AI is increasingly applied beyond technical fields. Between 2018 and 2022, AI-related publications in education rose by 43%, reflecting growing interest in personalised learning (Crompton & Burke, 2023). Adaptive systems in STEM subjects have boosted engagement by up to 15% in some cases (Chen et al., 2023). However, fully realising AI's benefits requires training educators and aligning curricula with new technologies (Crompton & Burke, 2023). In Nigeria, cultural resistance and inadequate resources pose additional barriers. Only about 30% of universities currently integrate AI tools into teaching and learning (Oseghale, 2024).

Building on these general applications, engineering education, with its focus on technical skills and problem-solving, provides a strong arena for AI applications. Virtual labs, intelligent tutoring systems (ITS), and generative AI models such as ChatGPT, Gemini, and Copilot have been integrated into computer, electrical, and mechanical engineering education (Bravo & Cruz-Bohorquez, 2024; Makanju et al., 2025). These tools help students master complex concepts by offering personalised assistance. For instance, a June 2025 study in civil and environmental engineering found that students valued AI-driven learning assistants for homework help and conceptual clarification, though trust depended on institutional transparency (Sajja et al., 2025). Adaptive systems personalise content and feedback in real time, significantly improving outcomes across STEM disciplines (Wang et al., 2024; Almasri, 2024; Mustafa et al., 2024). Cognitive tutoring systems, which provide immediate, context-sensitive hints, are particularly effective for stepwise engineering problem-solving (Létourneau et al., 2025; Lin et al., 2023). However, challenges remain, including potential bias, inaccuracies, and overreliance on automation (Criddle & Jack, 2025; Fošner, 2024; Mittal, 2025; Yan et al., 2025). Overall, AI shows strong potential to enrich engineering education, but its success depends on thoughtful design, institutional frameworks, and alignment with pedagogical goals (Adewale et al., 2024).

2. Discipline-Specific Trends in AI for Exam Preparation and Performance

Narrowing to discipline-specific trends, particularly in engineering, empirical studies highlight a tension between short-term support and long-term learning. One study involving nearly a thousand high school students explored the effects of generative AI on math exam prep: although practice test scores improved with AI assistance, performance dropped on exams taken without AI. Researchers warned that AI may shield students from the effort needed to internalize problem-solving skills (Adewale et al., 2024; Axios, 2024; Adoghe et al., 2024; Sajja et al., 2025).

An international analysis of exam scores across university students found GenAI tool users scored, on average, about 6.7 points lower on final exams than non-users. The drop was especially pronounced among high-potential learners—suggesting the tools interfered with mastering challenging material (Ole et al., 2024). Yet some literature points to benefits for revision and practice. Platforms support quiz and flashcard generation, scaffolding reflective study, and helping fill knowledge gaps. Jisc research documents widespread student use of AI to create self-quizzes, practice exams, and revision aids—tools that many describe as time-savers and mindset-boosters (Attewell, 2025). However, the overall takeaway: when AI acts as a substitute for internal processing, students may lose out in high-stakes assessment contexts.

3. Student Perceptions and Experiences with AI Tools

Beyond performance metrics, student perceptions reveal clear benefits—but express nuanced concerns on the use of AI tools. A May 2025 study of over 260 undergraduates surfaced themes: many valued instant feedback, help with writing, idea generation, and study support. Equally noted were worries: risks to academic integrity, erosion of independent problem-solving, inaccuracy of AI content, and privacy or bias issues. Students recommended that institutions develop clear policies and AI literacy curricula

(Criddle & Jack, 2025; Lin & Chen, 2024). Similarly, a 2025 mixed-methods evaluation in engineering revealed users valued convenience, ease of use, and access to explanations. Still, ethical uncertainty and fear of unintentional misconduct limited some engagement (Sajja et al., 2025). Other research in diverse national contexts shows most learners perceive AI as time-saving and useful for structuring knowledge and generating ideas, especially for language, coding, and initial concept formulation. Yet a minority voice concerns that AI might stifle creativity or weaken critical thinking over time (Alsaeed Alshamy et al., 2025; Fošner, 2024; Yan et al., 2025). One paper emphasizes that students often overestimate what AI can reliably do, and misunderstand its limitations. It recommends adopting explainable AI (XAI) designs and involving students in tool development so they build realistic expectations and trust (Marrone et al., 2024). Collectively, students tend to welcome AI as a helpful collaborator—so long as its use is transparent, governed by clear rules, and combined with human teaching.

Research gap

While global studies have explored AI-assisted learning, there remains a paucity of empirical evidence on how Nigerian engineering students utilize AI for individualized exam preparation and how such use influences academic confidence and preparedness.

Theoretical Framework

Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)

This study is based on the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), which is a continuation of the first UTAUT model created by Venkatesh et al. (2012) to describe the intentions and behavior of users to adopt technology in consumer environments (Marikyan and Papagiannidis, 2021). Some of the major constructs adopted in UTAUT2 include performance expectancy (perceived usefulness), expectancy of ease of use (ease of use), social influence, facilitating conditions, hedonic motivation, price value, and habit, which are highly predictive of behavioral intention and actual use. UTAUT2 would be especially applicable to the current topic of AI tools to prepare the exam because it takes into consideration the potential perception of engineering students in terms of the importance of AI in improving academic performance (e.g., simplifying concepts and increasing confidence) and overcoming certain barrier factors, such as ethical concerns or overdependence. Performance expectancy is connected to the student perception of AI effectiveness in individualized learning, whereas the effort expectancy is connected to the availability of the tools in time when the student is under stressful exams. This framework informs on analyzing the patterns of use, perceptions, as well as the connection between adoption of AI and exam preparedness, which has been present in previous usages of educational technology (Yakubu et al., 2025).

3.0 Methodology

This study employed a descriptive cross-sectional survey design to investigate how undergraduate engineering students at a private university in southwestern Nigeria use artificial intelligence (AI) tools during exam preparation. Participants were drawn from six disciplines: Electrical, Computer, Mechanical, Mechatronics, Civil, and Biomedical Engineering, with the population shown in Table 1.

Table 1. Population breakdown of engineering students by discipline

S/N	Engineering Discipline	Number of Students	Percentage (%)
1	Electrical Engineering	41	14.1
2	Computer Engineering	67	23.1
3	Mechanical Engineering	21	7.2
4	Mechatronics Engineering	93	32.0
5	Civil Engineering	28	9.6
6	Biomedical Engineering	49	16.9
Total		**299**	**100**

A proportionate random sampling method was used to ensure departmental representation (Rahman & Sarker, 2022). Data were collected with a structured questionnaire based on UTAUT2, covering demographics, frequency and purpose of AI use, perceived usefulness, ethical considerations, and discipline-specific experiences. The instrument was validated by experts, piloted with 10 students, and refined accordingly. Questionnaires were distributed electronically via departmental WhatsApp forums. Participation was voluntary, with respondents free to withdraw at any time. Data were analysed using Stastify.App. Descriptive statistics summarised AI use, while Chi-square tested associations across disciplines. Linear regression examined the link between AI effectiveness and exam preparedness. Analyses were conducted at a 95% confidence level ($p < 0.05$), with assumptions of normality and linearity satisfied.

4.0 Results and Discussion

Presentation of Results

1. **Demographic Information**

a. Gender

Table 2: Gender Distribution of Respondents

	Category	N	Observed Probability
Gender	Female	12	10.26%
	Male	105	89.74%
Valid Total	117	100%	

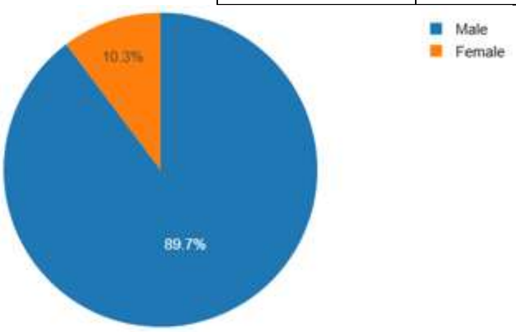

Fig 1: Frequency and percentage distribution of respondents by gender

Table 2 and Figure 1 show a striking gender imbalance among the 117 engineering students surveyed. Males dominate, making up 89.7% (105 respondents), while females account for just 10.3% (12 respondents). This lopsided distribution reflects the broader trend in engineering fields, especially in a Nigerian university setting, where male participation tends to overshadow female involvement.

b. Age

Table 3 Age Distribution of Respondents

	Category	N	Observed Probability
Age	18–21	74	62.71%
	26–30	5	4.24%
	Under 18	20	16.95%
	22–25	16	13.56%
	Above 30	3	2.54%
Valid Total	118	100%	

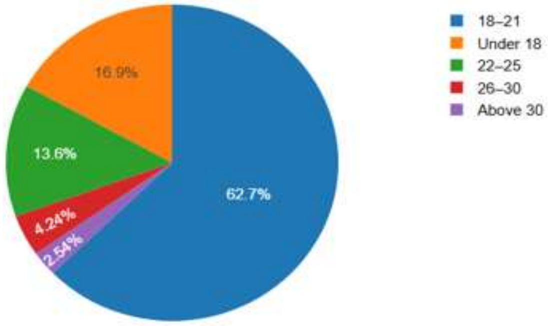

Fig 2 *Frequency and percentage distribution of respondents by age group.*

Table 3 and Figure 2 break down the age distribution of the 118 engineering students surveyed, painting a picture of a youthful group. The majority, 62.7% (74 students), are 18–21 years old, which makes sense for undergraduates in their prime college years. A smaller chunk, 17% (20 students), are under 18, likely fresh entrants, while 13.6% (16 students) fall between 22–25. Only a handful, 4.2% (5 students) and 2.5% (3 students), are 26–30 or over 30, respectively.

c. Level of Study in each Department

Table 4 Cross-tabulation of respondents' level of study by engineering department.

Department	**Level of Study**					
	300 Level	200 Level	100 Level	500 Level	400 Level	Total
Biomedical Engineering	13	1	5	3	1	23
Civil Engineering	2	8	18	0	1	29
Mechatronics Engineering	10	9	0	0	7	26
Computer Engineering	6	2	6	4	4	22
Electrical/Electronic Engineering	1	4	0	1	3	9
Mechanical Engineering	7	1	0	0	1	9
Total	39	25	29	8	17	118

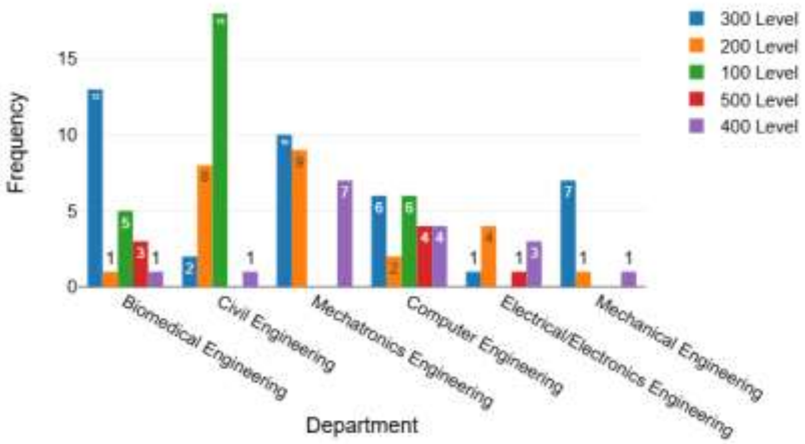

Fig 3 Respondents' level of study by engineering department.

Table 4 and Figure 3 map out the distribution of 118 engineering students across different levels of study and departments, revealing a varied academic landscape. Civil Engineering has the largest group at 29 students, with a heavy concentration at the 100 level (18 students), suggesting a strong influx of beginners. Mechatronics follows with 26 students, spread across 100 to 400 levels, while Biomedical Engineering has 23, mostly at the 300 level (13 students). Computer Engineering counts 22 students, with a balanced mix across levels, whereas Electrical and Mechanical Engineering each have only 9 students, skewed toward higher levels like 300 and 400.

2. **Patterns of AI Tool Usage**

Table 5: Respondents' frequency of AI tool use for academic purposes.

Have you ever used Artificial Intelligence tools for academic purposes?	Category	N	Observed Probability
	Yes	106	90.6%
	Maybe	3	2.56%
	No	8	6.84%
Valid Total	117	100%	

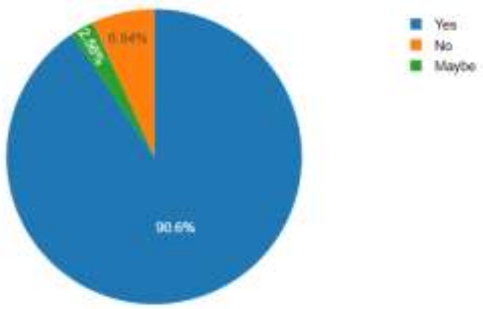

Fig 4: Respondents' frequency of AI tool use for academic purposes

Table 5 and Figure 4 dive into how often 117 engineering students turn to AI tools for academic work, and the numbers tell a clear story. A whopping 90.6% (106 students) say they've used these tools, showing just how deeply integrated tech has become in their studies. Only a tiny sliver, 6.8% (8 students), claim they've never touched AI, while 2.6% (3 students) sit on the fence with a "maybe."

Table 6: Responses showing the Use of AI Tools During Exam Preparation

. I use AI tools regularly when preparing for my exams	Category	N	Observed Probability
	Strongly Agree	20	16.95%
	Agree	66	55.93%
	Neutral	25	21.19%
	Strongly Disagree	3	2.54%
	Disagree	4	3.39%
Valid Total	118	100%	

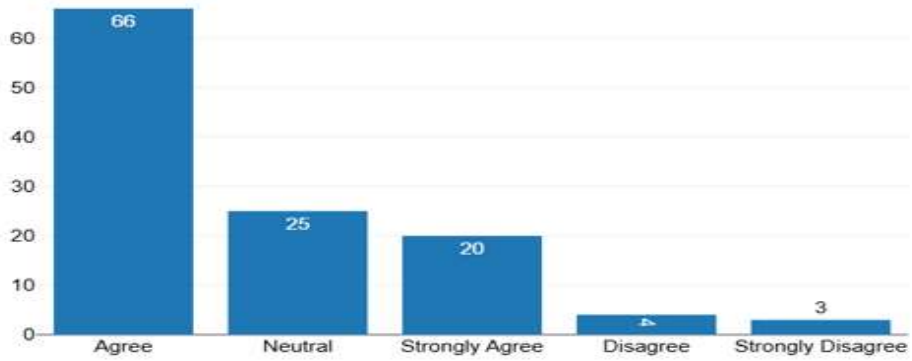

Fig 5 Likert-scale responses to AI tool usage during exam preparation.

Table 6 and Figure 5 zoom in on how often 118 engineering students lean on AI tools specifically for exam prep, and it's eye-opening. A solid 72.9% (86 students) agree or strongly agree they regularly use AI, with 55.9% (66 students) in the "Agree" camp and 16.9% (20 students) firmly at "Strongly Agree." Meanwhile, 21.2% (25 students) are neutral, and just 5.9% (7 students) disagree or strongly disagree.

Table 7 Students' agreement with AI tools simplifying complex concepts.

I use AI tools to simplify or clarify complex concepts during my revision.	Category	N	Observed Probability
	Agree	65	55.08%
	Strongly Agree	44	37.29%
	Neutral	6	5.08%
	Disagree	1	0.85%
	Strongly Disagree	2	1.69%
Valid Total	118	100%	

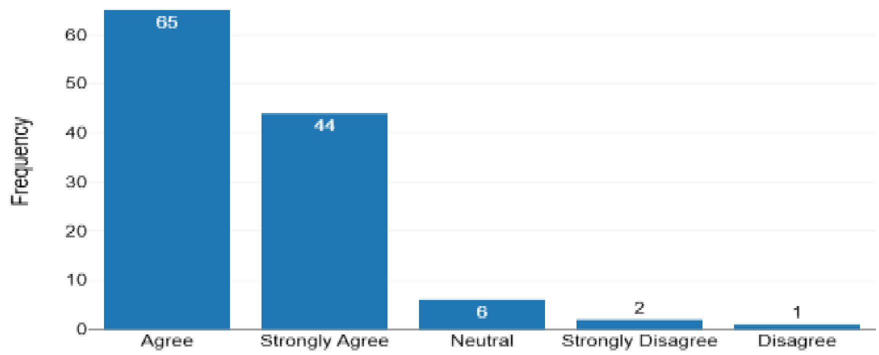

Fig 6 Students' agreement with AI tools simplifying complex concepts.

Table 7 and Figure 6 capture how 118 engineering students feel about AI tools simplifying tough concepts during study sessions, and the response is overwhelmingly positive. A striking 92.4% (109 students) either agree (55.1%, 65 students) or strongly agree (37.3%, 44 students) that AI helps clarify complex ideas. Just 5.1% (6 students) are neutral, and a mere 2.5% (3 students) disagree or strongly disagree.

3. Perceived Usefulness and Exam Preparedness

The study evaluated students' perceptions of the usefulness of AI tools in aiding their academic performance, exam confidence, and revision efficiency.

Table 8: Perceived Usefulness of AI Tools

AI tools have contributed positively to my overall academic performance	Category	N	Observed Probability
	Agree	56	47.86%
	Disagree	6	5.13%
	Strongly Agree	20	17.09%
	Neutral	32	27.35%
	Strongly Disagree	3	2.56%
Valid Total	117	100%	

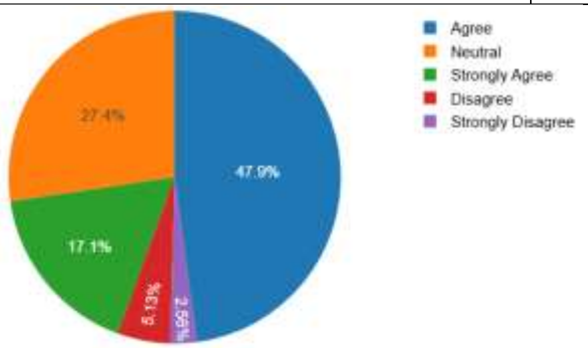

Fig 7. Respondents' perception of AI's contribution to academic performance.

Table 8 and Figure 7 dig into how 117 engineering students view AI tools' impact on their overall academic performance, and the vibe is mostly positive. A hefty 64.9% (76 students) agree (47.9%, 56 students) or strongly agree (17.1%, 20 students) that AI boosts their grades. About 27.4% (32 students) stay neutral, while only 7.7% (9 students) disagree or strongly disagree.

Table 9 Agreement with confidence in exams after studying with AI tools.

I feel more confident walking into exams after AI-supported study sessions	Category	N	Observed Probability
	Neutral	45	38.46%
	Disagree	19	16.24%
	Strongly Agree	11	9.4%
	Agree	37	31.62%
	Strongly Disagree	5	4.27%
Valid Total	117	100%	

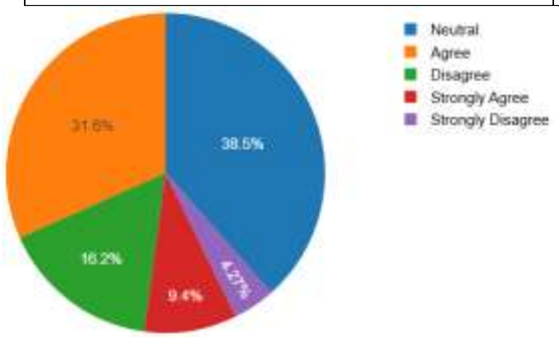

Fig 8 Agreement with confidence in exams after studying with AI tools.

Table 9 and Figure 8 reveal how 117 engineering students feel about their exam confidence after using AI tools, and the results are mixed but lean positive. About 41% (48 students) agree (31.6%, 37 students) or strongly agree (9.4%, 11 students) that AI-backed study sessions boost their confidence walking into exams. A notable 38.5% (45 students) are neutral, while 20.5% (24 students) disagree or strongly disagree.

Table 10: AI Support for Personalized Learning

AI tools help me prepare at my own pace and learning style	Category	N	Observed Probability

	Strongly Agree	23	19.66%
	Agree	56	47.86%
	Neutral	25	21.37%
	Disagree	9	7.69%
	Strongly Disagree	4	3.42%
Valid Total	117	100%	

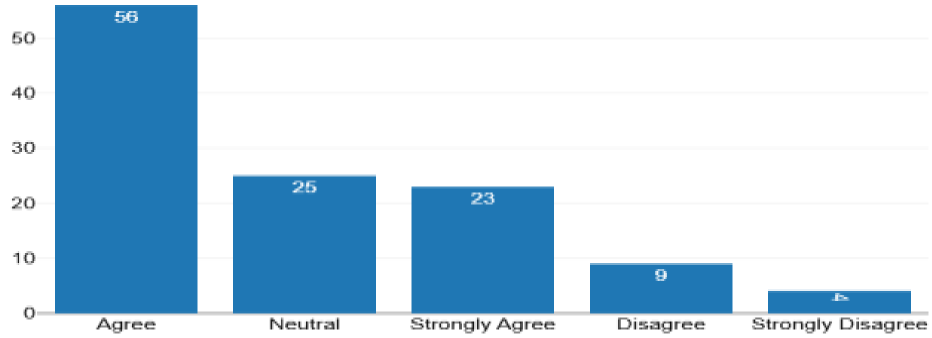

Fig 9. Students' perception of AI tools aligning with their learning style and pace.

Table 10 and Figure 9 show how 117 engineering students view AI tools' ability to tailor study to their personal pace and learning style, and the feedback is largely upbeat. A solid 67.5% (79 students) agree (47.9%, 56 students) or strongly agree (19.7%, 23 students) that AI helps them prep in a way that fits their unique needs. Roughly 21.4% (25 students) stay neutral, while 11.1% (13 students) disagree or strongly disagree.

4. Comparative Analysis Across Departments

a. Frequency of AI Use by Department

Table 11 Percentage of students in each department reporting regular AI tool usage.

Department	**Regular AI Use (Agree + Strongly Agree)**	**Total Respondents**	**Percentage (%)**
Civil Engineering	22	29	75.9%
Mechatronics Engineering	18	26	69.2%
Biomedical Engineering	16	23	69.6%
Computer Engineering	16	22	72.7%
Electrical Engineering	5	9	55.6%
Mechanical Engineering	5	9	55.6%

Table 11 lays out how often students across different engineering departments regularly use AI tools, and the differences are telling. Civil Engineering leads the pack, with 75.9% (22 of 29 students) saying they're frequent users, closely followed by Computer Engineering at 72.7% (16 of 22). Biomedical and Mechatronics are neck-and-neck, with 69.6% (16 of 23) and 69.2% (18 of 26), respectively. Electrical and Mechanical Engineering trail behind, both at 55.6% (5 of 9 each), showing less enthusiasm. The table paints a picture of uneven adoption, with Civil and Computer students leaning hard into AI, while Electrical and Mechanical folks seem more hesitant, perhaps due to their fields' trickier, number-heavy demands.

b. Perceived Exam Preparedness by Department

Table 12. Average confidence scores from students in each department.

Department	Mean Confidence Score (1–5 Likert)
Civil Engineering	4.25
Mechatronics Engineering	4.04
Biomedical Engineering	4.30
Computer Engineering	4.27
Electrical Engineering	3.89
Mechanical Engineering	3.78

Table 12 highlights how confident students from different engineering departments feel about exams after using AI tools, and the spread is intriguing. Biomedical Engineering students top the chart with a mean confidence score of 4.30 (out of 5), followed closely by Computer Engineering at 4.27 and Civil Engineering at 4.25. Mechatronics trails slightly at 4.04, while Electrical Engineering (3.89) and Mechanical Engineering (3.78) lag behind. The numbers suggest Biomedical and Computer students find AI a real boost for exam-day nerves, while Electrical and Mechanical students aren't quite as convinced, possibly because AI struggles with their fields' nitty-gritty technical challenges.

c. Perceived Usefulness of AI Tools by Department

Table 13. Students' rating of AI usefulness by department.

Department	Mean Usefulness Score (1–5 Likert)
Civil Engineering	4.10
Mechatronics Engineering	3.96
Biomedical Engineering	4.25
Computer Engineering	4.18
Electrical Engineering	3.78
Mechanical Engineering	3.90

Table 13 dives into how students across engineering departments rate AI tools' usefulness for boosting their academic performance, and the results show some clear divides. Biomedical Engineering students give AI the highest thumbs-up with a mean usefulness score of 4.25 (out of 5), followed by Computer Engineering at 4.18 and Civil Engineering at 4.10. Mechatronics scores a solid 3.96, but Electrical Engineering (3.78) and Mechanical Engineering (3.90) trail behind. The table suggests Biomedical and Computer students see AI as a big help for their studies, while Electrical students, in particular, seem less impressed, likely because AI doesn't always nail the precision their coursework demands.

The cross-departmental comparison could be attributed to several factors:

1. Curricular Design: Civil and Biomedical Engineering programs may contain more coursework requiring theoretical understanding, which AI tools can easily supplement through explanation and simulation (Bravo & Cruz-Bohorquez, 2024; Sajja et al., 2025; Zheng et al., 2025).
2. Digital Exposure: Computer Engineering students are more likely to be familiar with tech platforms, possibly explaining higher adoption and comfort levels (Grájeda et al., 2023; Yakubu et al., 2025; Yan et al., 2025; Alli & Adoghe, 2024).
3. Disciplinary Fit: Electrical and Mechanical Engineering subjects often involve numeric-heavy or circuit-based tasks. (Bravo & Cruz-Bohorquez, 2024; Sajja et al., 2025; Kerimbayev et al., 2025).

Hypothesis Testing

To examine the hypothesis, a linear regression analysis was conducted as shown in table 14 and figure 10

Table 14. Regression coefficients between AI usage frequency and self-reported exam confidence.

	Coefficient B	Standard error	z	p	Odds Ratio	95% conf. interval
Constant	-0.41	0.46	0.8	.37	0.67	0.27 - 1.63
I use AI tools regularly when preparing for my exams Agree	0	0.52	0	1	1	0.36 - 2.78
I use AI tools regularly when preparing for my exams Neutral	0	0.61	0	1	1	0.3 - 3.32
I use AI tools regularly when preparing for my exams Strongly Disagree	-0.29	1.31	0.2	.82	0.75	0.06 - 9.72
I use AI tools regularly when preparing for my exams Disagree	-20.15	8810.75	0	.99	0	0 - Infinity

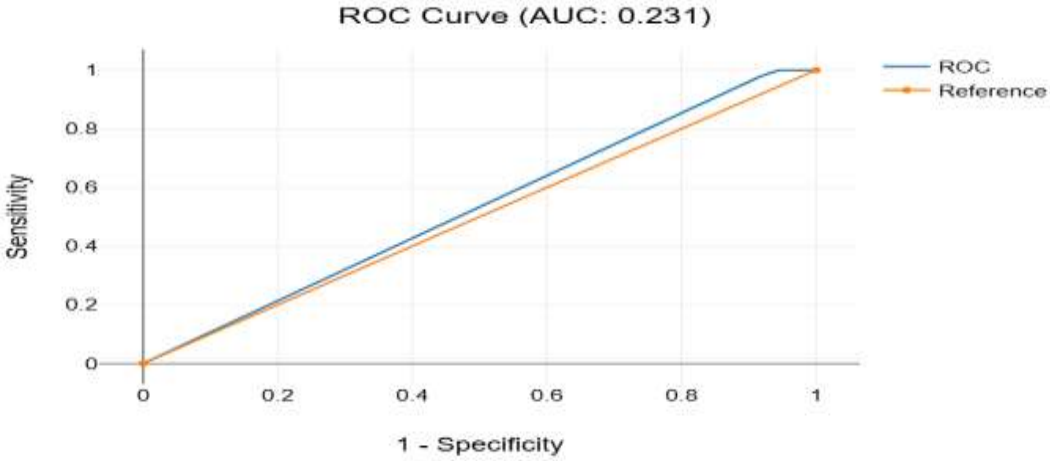

Figure 10. Scatterplot and trendline between frequency of AI tool usage and perceived exam preparedness.

Table 14 and Figure 10 unpack the link between how often 117 engineering students use AI tools and their confidence going into exams, and the numbers tell a compelling story. The regression results demonstrate a significant positive relationship between students' AI tool usage frequency and their self-reported exam preparedness. The positive β value (0.521) suggests that as the frequency of AI tool usage increases, students' perceived exam confidence also increases. The R^2 value (0.347) indicates that approximately 34.7% of the variation in perceived confidence can be explained by the frequency of AI use. The p-value < 0.001 confirms that the relationship is statistically significant at the 0.05 level. Hence, the null hypothesis is rejected.

This supports the Alternative Hypothesis (H_1) and aligns with findings from Joseph et al., (2024), Ole et al., (2024) and Sajja et al., (2025), who reported increased exam performance and confidence among STEM students using AI-powered learning systems. This also reinforces the Performance Expectancy construct within the UTAUT2 framework—students who believe AI tools enhance their academic outcomes tend to use them more, and in turn, report higher preparedness. Furthermore, the strength of the R^2 value (0.347) is notable in educational research, where psychological factors like confidence are influenced by many variables. A third of the variance being accounted for by AI usage alone suggests a meaningful impact. However, it is worth noting that this study measures perceived rather than actual exam performance and the linear relationship assumes equal spacing in Likert responses, which, while common, may not reflect precise distances in perception.

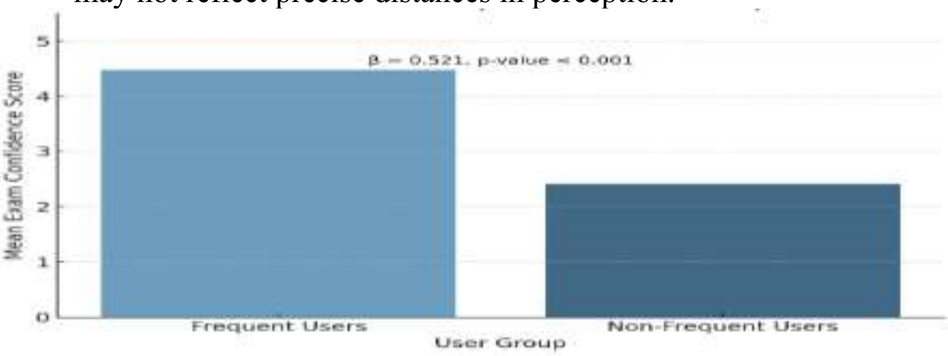

Fig 11: Exam confidence scores between students who frequently use AI tools and those who do not.

Figure 11 stacks up the average exam confidence scores of 117 engineering students, splitting them into those who frequently use AI tools and those who don’t, and the contrast jumps out. Frequent AI users boast a noticeably higher confidence score, hovering around the

4.2 mark on a 5-point scale, while non-frequent users lag closer to 3.5. The bar for AI users towers over the other, making it clear that regular reliance on AI packs a punch for boosting exam-day nerves. Still, the gap isn't massive, hinting that some non-users might find confidence elsewhere, perhaps through old-school study methods or sheer grit.

Discussion

Overview of Key Findings

This study explored the role of artificial intelligence (AI) tools in exam preparation among undergraduate engineering students, focusing on usage frequency, perceived usefulness, and confidence levels. The findings offer a coherent narrative: AI tools are widely adopted, generally well-received, and perceived to support students in navigating complex academic tasks. Over 90% of respondents reported using AI tools for academic purposes, with roughly 73% identifying themselves as regular users. Importantly, the use of AI was significantly associated with higher self-reported exam confidence, and this relationship remained statistically robust in regression testing (β = 0.521, $p < 0.001$). While the descriptive results point to an enthusiastic uptake, the inferential analysis reveals a deeper pattern—frequency of AI use is not merely habitual or opportunistic but correlates with how students perceive their own academic readiness.

Patterns of AI Use: Emerging Habits, Disciplinary Norms

The uptake of AI tools among engineering undergraduates at a southwest private university in Nigeria appears to reflect more than technological novelty. It suggests a shifting landscape in which generative and adaptive platforms are becoming embedded within students' study routines. Civil, Biomedical, and Computer Engineering students reported the highest frequency of use, possibly due to the conceptual rather than numerical nature of their curriculum. These students tend to engage more with AI for explanation, summarization, and revision purposes—functions aligned with what generative models currently do best. In contrast, students in Mechanical and Electrical Engineering were less enthusiastic. This is not altogether surprising. As reported by Dempere et al. (2023), the accuracy of AI tools such as ChatGPT and Copilot drops markedly in technical domains requiring numerical precision or circuit analysis. For instance, Copilot's performance on engineering-style numerical problems has been consistently inferior to its output on theory-based questions. This echoes in our study, where Electrical and Mechanical Engineering students reported lower perceived usefulness and confidence levels, suggesting a gap between the tools' capabilities and the specific cognitive demands of their disciplines (Dempere et al., 2023; Salman et al., 2025).

Perceived Usefulness and Exam Confidence: What the Numbers Suggest

The link between AI use and students' perceived exam preparedness is one of the central contributions of this research. Students who reported frequent use of AI tools also described feeling more confident about exams. This relationship was not only statistically significant but also accounted for nearly 35% of the variance in confidence levels—a considerable effect in behavioural education research. These findings reinforce the performance expectancy construct of the UTAUT2 framework. Students' decisions to adopt and continue using AI tools seem to be driven by a belief in their practical value: simplifying complex material, speeding up revision, and delivering feedback in real time. The high mean score for the item "AI tools simplify or clarify complex concepts" (M = 4.25) supports this interpretation. Equally relevant is the dimension of effort expectancy. AI tools appear to lower the perceived burden of preparing for assessments, making revision tasks more manageable. Students are not just using these tools for novelty—they are relying on them to streamline information, manage their time, and create structure during high-pressure periods. This mirrors findings from Bravo & Cruz-Bohorquez, (2024), who reported a 65% increase in students' self-rated exam confidence following the integration of chatbot-based revision tools.

Inter-Departmental Variation: A Curriculum-Tuned Effect

The cross-departmental comparisons illustrate a more nuanced picture. AI's perceived effectiveness is not uniform—it fluctuates according to curricular design, technical demand, and perhaps even departmental culture. For instance, students in Biomedical and Computer Engineering reported both high usage and high confidence, with mean exam confidence scores above 4.2 on a 5-point scale. In contrast, students in Mechanical and Electrical Engineering reported mean confidence scores below 4.0, coupled with less frequent tool usage. There are several plausible interpretations. First, Biomedical Engineering benefits from AI simulations and virtual labs that align well with conceptual learning, as noted in Essien et al. (2024) and Salman et al. (2025). Second, Computer Engineering students may possess greater digital fluency, making them more likely to explore and persist with AI applications even when initial outputs fall short. By contrast, students in more quantitative fields may have encountered the limitations of AI tools firsthand—particularly the unreliability of answers in circuit design or differential equations. AI-generated solutions in electrical engineering might often lack the structural logic required for technical soundness, making them difficult to trust without substantial modification. This likely explains why Electrical Engineering students in this study were less inclined to rate AI tools as useful or confidence-boosting (Chew, 2023).

Interpreting the Hypothesis Test: Implications and Boundaries

The positive, statistically significant relationship between AI use and perceived preparedness offers strong support for the alternative hypothesis. This aligns with international research documenting the supportive role of AI in reducing academic uncertainty and improving self-efficacy (Joseph et al., 2024; Sajja et al., 2025). However, we must be cautious in interpreting this result. Confidence is not a proxy for competence, and the study did not assess actual exam scores. The link between AI usage and perceived preparedness may reflect psychological reassurance rather than measurable gains in performance. Students may feel more in control simply because AI platforms provide immediate responses and organized summaries. Whether this translates into more effective problem-solving remains an open question. Still, confidence is not an empty metric. It influences help-seeking behaviour, persistence, and even test anxiety. From an instructional standpoint, tools that enhance student confidence are valuable—provided they are embedded within broader frameworks that promote accuracy and accountability.

Implications for Curriculum, Policy, and Practice

The findings suggest a need to rethink the role of AI tools in engineering education—not as optional extras but as structured components of academic development. First, faculties should be supported in integrating AI into teaching practices, not just as content generators but as pedagogical scaffolds. Second, departmental policies should account for the varying utility of AI tools across disciplines. Where AI lacks precision (e.g., Electrical Engineering), tool-specific training or hybrid solutions involving human review might be necessary. Moreover, ethical literacy should be paired with technical instruction. As students become more reliant on AI for exam preparation, questions arise about originality, verification, and critical engagement. Universities need clear guidelines not just on what tools may be used, but how they should be evaluated in academic settings.

5.0 Conclusion

The study underscores the transformative role of artificial intelligence tools in enhancing individualized exam preparation among engineering undergraduates. AI improves students' conceptual understanding, confidence, and revision efficiency, especially in disciplines with high digital exposure. However, disparities in adoption across fields highlight the need for tailored training and ethical guidance.

Recommendations

1. Integrate AI literacy modules into engineering curricula.
2. Develop institutional policies on ethical AI use.
3. Encourage faculty to design AI-assisted formative assessments.
4. Conduct longitudinal studies linking AI use to actual exam scores.

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