



Assessing Students' Decisions to Use Generative Artificial Intelligence Technology for Learning

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Abstract

Generative Artificial Intelligence (GAI) technologies such as Perplexity, Gemini, and ChatGPT have quickly become essential in higher education by enabling the creation of human-like instructional content and enhancing various teaching and learning processes. However, their usage in Nigerian universities, especially in Ondo State, faces challenges, largely due to students' hesitancy to use new and emerging technologies for instructional purposes. This study assessed students' decisions to use GAI for learning within the framework of diffusion of innovation theory. A descriptive survey research was used. The study sampled 1,036 students from five public universities in Ondo State. An Assessment of Students' Decisions to Use Generative Artificial Intelligence Technology for Instruction Questionnaire (ASDUGAITIQ), containing sections on demographics, student adoption/user categories, and decisions to use GAI for instruction, was administered. Students in state universities demonstrated significantly higher levels of use than those in federal universities ($\chi^2 = 2.04 > 1.87$), respectively. However, no significant difference in the decision to use GAI for instruction based on students' categories ($F(1033) = 2.894; p > 0.05$) and there is a significant difference in students' use of GAI for instruction based on university ownership ($t = -5.65; p < 0.05$). The study concluded that there was unevenness in adoption categories across demographics, where institutional ownership introduced complex dynamics, which underscored the need for differentiated institutional interventions and equity-driven strategies that support students' confident and inclusive use of GAI. It was recommended that universities invest in curricular development and integration to deepen students' learning and academic performance.

Keywords: Decisions to use, Diffusion of innovation, Generative artificial intelligence, Instruction, Students' categories.

1. Introduction

Education is a weapon for survival in the physical world and plays a vital role in national and international advancement. Given the importance of universities in national development and in propelling students' learning and national progress, the adoption and integration of Generative Artificial Intelligence (GAI) as a new technological innovation in Nigerian universities appears to be critically needed and should be actively supported and implemented.

Artificial Intelligence (AI), as defined by Ocana *et al.* (2019, p.536), is a subset of computer science dedicated to crafting intelligent systems that exhibit behaviours akin to human intelligence. Copeland (2022) viewed AI as a computer-controlled robot organised or assigned to execute tasks, which ordinarily require human intelligence to conduct. Frankenfield (2023) conceptualised AI as the emulation of human intelligence to perform human beings' tasks through software-coded heuristics. Within the context of education, Dimitriadou and Lanitis (2023, p.3) posited that the specific field of AI in education has begun to influence the application of technology to instruction, improve the learning process, and promote lecturers' and students' academic achievements. Intelligent books, web browsers, educational apps, and learning platforms are just a few examples of how AI has permeated the education sector (Karsenti, 2019, p. 112).

The aim of AI in education is to establish AI-powered systems such as virtual pedagogical agents and robots. And intelligent systems that allow flexible, engaging, and personalised learning, as well as to automate daily tasks of teaching (AlFarsi *et al.* 2021, p. 229). Ogunode and Olowonefa (2023, p. 47) examined the applicability of AI in Nigerian schools and concluded that AI can be applied in the preparation of student result reports, school administration, aid effective learning, effective teaching implementation (intelligent tutoring), virtual learning environment, and effective data management. The use of AI in higher institutions of learning has grown significantly in countries all over the world over the past decade and is likely to continue to do so as AI capabilities improve and universities become more comfortable with adopting and integrating the technology into academic activities (Nsoh *et al.*, 2023, p. 38).



Beyond AI's general application, Baidoo-anu and Owusu (2023, p. 52) argued that the advancements and the broadening scope of machine learning have facilitated the development of increasingly sophisticated technologies for producing digital content, such as generative artificial intelligence (GAI). GAI is an unsupervised or partially supervised machine learning framework that uses probabilities and statistics to create artificial content (Jovanović, 2023). GAI refers to the creation of content, which can include images, text, code, models, audio, and more, utilising AI-powered tools (Abdullah & Zaid, 2023, p. 84). Similarly, GAI refers to innovative technology that incorporates user-generated material, licensed third-party data, deep learning models trained on large datasets collected from numerous public sources, and information produced by human reviewers (Romero *et al.*, 2024, p. 129).

GAI has the potential to completely transform how students interact with educational materials and learn in higher education (Jaboob *et al.* 2024, p. 4). Its applications hold promise for transforming education through adaptive learning tailored to individual abilities and needs, encompassing personalised learning, task automation, smart content creation, adaptable access, and Intelligent Tutoring (Zhang & Aslan, 2021, p. 5). For instance, chatbots driven by GAI could furnish personalised feedback on assignments or address students' inquiries in real time (Ramu *et al.*, 2022, p. 10378). GAI facilitates the development of interactive textbooks that adjust to the specific needs of individual learners, fostering a more engaging and efficient learning environment (Chen & Asta, 2022, p. 80).

Diffusion of Innovation (DOI) Theory

Rogers first introduced the Diffusion of Innovation (DOI) theory in 1962. This theory explains how, why, and at what rate innovative ideas and technologies are disseminated. According to Sahin (2006, p. 3), the diffusion of innovations theory is particularly suitable for examining technology adoption within higher education and educational settings. Rogers defined diffusion as the process through which an idea, practice, or object perceived as new by an individual or other unit of adoption is communicated via specific channels over time among members of a social system. The novelty of an innovation may be demonstrated through knowledge, persuasion, or the decision to adopt. The theory delineates five adopter categories based on relative innovativeness: innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003, p. 5). Innovators, early adopters, and the early majority are considered earlier adopters, whereas the late majority and laggards are classified as later adopters. The four principal elements of the diffusion of innovations (DOI) theory are innovation, communication channels, time, and the social system.

The innovation-decision process refers to the sequence through which individuals adopt innovative ideas before others. According to Rogers (2003, p. 6), this process is characterised by information-seeking and information-processing activities, as individuals attempt to reduce uncertainty regarding the benefits and drawbacks of an innovation. Rogers (2003, p. 8) identified five sequential steps in the innovation-decision process: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. These stages occur in a time-ordered sequence. Figure 1 presents a model of the five stages in the innovation-decision process.

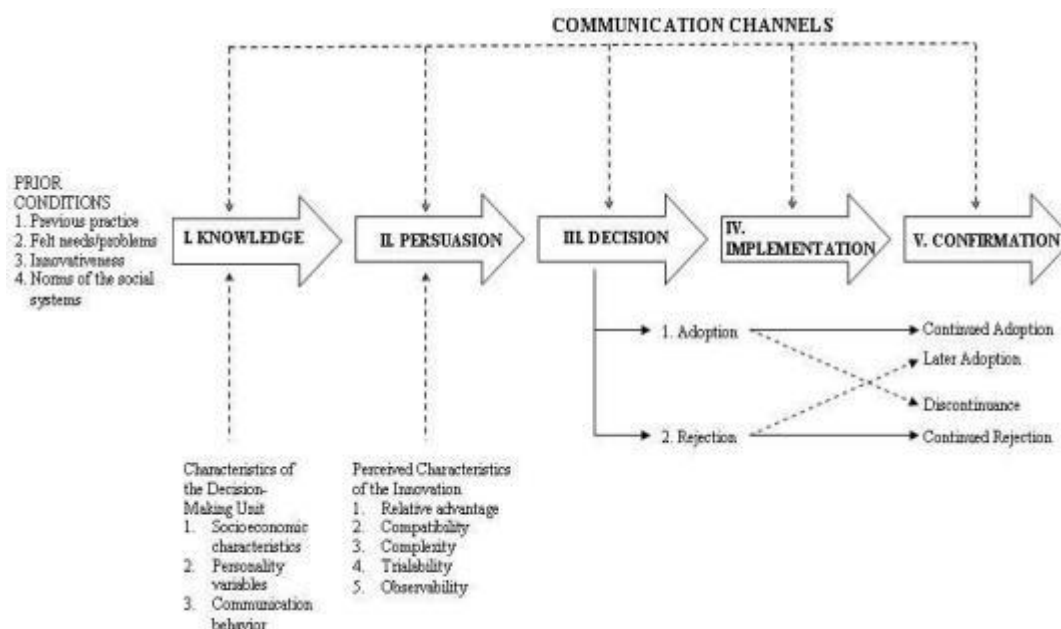


Figure 1:
A Model of the Five Stages in the Innovation-Decision Process (Rogers, 2003, p. 8)

Sahin (2006, p. 5) explained that to effectively use an innovative technology, both how-to experience and know-why experience are essential. The provision of knowledge on the benefits of GAI to teachers will enhance their utilisation of it for instruction. This is because a lack of adequate knowledge on the importance, benefit, and reason for the utilisation of GAI might stir up a negative perception of the adopters, which might affect their GAI use for instruction.



The Persuasion Stage: At the persuasion stage, the stakeholders evaluate the merits and demerits of generative AI, which will lead them to use AI for education. According to Rogers, persuasion is needed to enable stakeholders to use GAI. This is because, according to Rogers (2003, p. 7), the following characteristics contribute to the utilisation of technologies: relative advantages, compatibility, complexity, trialability and observability, which are important for the persuasion stage.

The Decision Stage: At the decision stage in the innovation-decision process, students might either choose to use or reject the AI innovation. Adoption means that the student has decided to fully use GAI innovations, while rejection means that the student has decided not to use GAI innovations for instruction. The student might decide to utilise an innovation but later change his/her mind not to utilise the innovation again, this is known as a discontinuance decision. Similarly, Kopcha (2012, p. 1109) added that students without a vision for technology use for education might abandon their efforts to integrate technology when they encounter challenges. The student might decide not to use the innovation but later decide to use it; this is known as later adoption.

The Implementation Stage: At the implementation stage, GAI innovation is utilised for instruction. At this stage, the lecturers or students might need technical support and assistance for the successful utilisation of GAI technology. Reinvention can also occur at the implementation stage, which is the degree to which GAI innovation is changed or modified by a lecturer or student in the process of its utilisation. For example, an AI learning platform like Netex Learning allows lecturers to create customised learning content for students and incorporate interactive elements in the learning content (Wadhwa, 2017, p. 207).

The Confirmation Stage: Discontinuance may occur at this stage, as the decision to utilise generative AI technologies can be reversed if the lecturer experiences any difficulty or frustration in using the AI technologies during the implementation stage, or if their expectation about the innovation is not met and they are not satisfied with the performance of the GAI. Communication Channels: The second element of the diffusion of innovations process is communication channels. Communication is the process whereby lecturers or students in the university create and share information and ideas about the use of GAI innovation, either through mass media channels or interpersonal channels. For example, a study by Kwafo (2019) stated that most of the respondents got the awareness about AI through seminars, journals, and the media. Also, the study of Ipsos MORI (2017) showed that 69% of men who have heard of Machine Learning (ML) said it was from mainstream media, 19% got the information through entertainment and 19% heard about ML from friends or family. Communication about the use of GAI among lecturers and students will be frequent since the university lecturers are homophilic. They share similarities in attributes, including beliefs, educational background, socioeconomic status, assigned tasks, and responsibilities. These communication processes lead to the awareness of lecturers on technology innovation.

Time Taken: Not all lecturers and students will use GAI for instruction at the same time. The innovation-diffusion process, adopter categorisation, and rate of adoption all include a time dimension (Sahin, 2006, p. 3). The innovation diffusion process categorises adopters by their rate of adoption: Innovators, Early Adopters, Early Majority, Late Majority, and Laggards. Innovators are lecturers or students who consistently lead in utilising GAI for instructional purposes. Innovators are small groups of early adopters who are committed and ready to utilise AI for education. They are the first people to utilise AI for education and are prepared to bear the consequences of utilising AI. Early adopters are those who hold leadership roles in the university education system. Early adopters are the university authorities, curriculum planners, and policymakers who are involved in the utilisation of GAI from initiation to implementation by its integration into the university system. They are involved in the organisation of seminars to enlighten lecturers on the utilisation of AI in universities (Rogers, 2003, p. 5).

The late majority comprises university students who are reluctant to utilise AI; they wait until most of their colleagues have done so. Stakeholders in this group do not want to use GAI until they have been convinced and persuaded, and have assessed the pros and cons of using GAI and found it safe to use. Laggards are lecturers and students who want to make sure that GAI for instruction works and is utilised by others before adopting it, as they continue to hold on to the traditional means of instructional delivery. Most of the time, they are mandated to use the AI innovation before they do. The adopter categorisation based on innovativeness is presented in Figure 2:

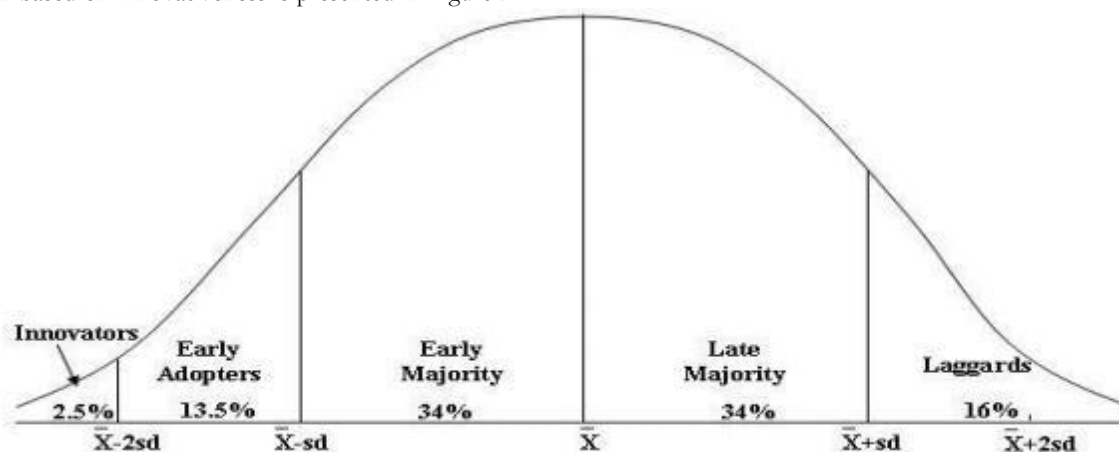




Figure 2:

Adopter Categorisation Based on Innovativeness (Rogers, 2003)

Social System: A social system is defined as a set of interrelated units engaged in joint problem solving to achieve a common goal (Rogers, 2003, p. 5). Within a university context, stakeholders' adoption of GAI for instructional purposes may be shaped by factors such as peer groups, departmental affiliation, gender, and type of university ownership.

2. Statement of the Problem

The use of GAI in Nigerian universities, particularly in Ondo State, faces significant challenges due to students' reluctance to embrace and use the new technological innovation for instructional purposes. This problem is compounded by gender disparities, university ownership, infrastructural barriers, and the absence of robust ethical and regulatory frameworks, all of which may hinder the responsible use of GAI amongst the undergraduates in public universities in Ondo State.

Although previous research has examined these issues separately, there was a lack of comprehensive studies applying the Diffusion of Innovation (DOI) framework, which considered the influence of environmental and social factors influencing undergraduates' decisions to embrace and use GAI for instruction. Thus, the main gap this study seeks to fill is the assessment of how DOI constructs impact the use of GAI for instruction among undergraduates in Ondo State.

3. Research Questions

1. What is the difference in the students' categories in the use of GAI for instruction?
2. What is the students' decision to use GAI for instruction?
3. What is the difference in students' use of GAI for instruction based on university ownerships?

4. Research Hypotheses

The following hypotheses were evaluated at the 0.05 level of significance in this study:

H0₁: There is no significant difference in the decision to use GAI for instruction based on students' categories

H0₂: There is no significant difference in students' use of GAI for instruction based on university ownership

5. Methodology

This study adopted a descriptive research design of the survey type. The population of the study consisted of all the undergraduates in the five public universities located in the three Senatorial Districts of Ondo State, Nigeria. The sample consisted of one thousand and thirty-six undergraduates selected from two state-owned public universities. The instrument for the undergraduates, which was extracted from diffusion of innovation (DOI) frameworks, was designed by the researcher using GAI and pilot tested for reliability, with a Cronbach alpha coefficient of 0.71. This instrument was employed to collect data from the sampled universities in Ondo State, Nigeria. The researcher-designed questionnaire elicited responses from the students. The questionnaire consisted of two sections (A and B). Section A was used to elicit information on the demographic data of the respondents, whereas section B was divided into two parts: Part (i) was on categories of students' users, and Part (ii) was on students' decisions to use GAI for instruction, which consisted of 10 items to collect data on students' decisions to use GAI for instruction. The questionnaire was rated on four-point Likert rating scales of SA (Strongly Agree = 4), A (Agree = 3), D (Disagree = 2), and SD (Strongly Disagree = 1). Descriptive and inferential statistics were employed to collect, compile, and assess the data. Frequency, percentages, means, and standard deviations addressed the research questions. Using the Statistical Product for Service Solution (SPSS), an ANOVA evaluated the hypothesis on students' categories and decisions, while an independent t-test examined the hypothesis on university ownership. All hypotheses were evaluated at a significance level of 0.05.

6. Results

The data presented in this section captures both the key variables of the study and the demographic background necessary for assessing university lecturers' use of Generative AI (GAI) for instruction in Ondo State, Nigeria. Out of the 1056 students sampled, 1036 provided valid responses, yielding a response rate of 98.1%. This high response rate enhances the reliability of the findings by minimising potential non-response bias. The demographic distribution of the student participants is summarised in Tables 1 and 2



Table 1:
 Distribution of Student Respondents by School Ownership

School Ownership	No of Students	Percentage (%)
Federal University	487	47.0
State University	549	53.0
Total	1036	100.0

The distribution of respondents by school ownership is shown in Table 1. The student population shows a larger proportion enrolled in state universities (53.0%) compared to federal universities (47.0%). This divergence underscores structural differences in staffing and enrolment patterns between federal and state universities, which may in turn shape the dynamics of Generative AI adoption for instruction, given the potential variations in resources, institutional policies, and student demographics across ownership types.

Table 2:
 Distribution of Students by Categorisation on GAI Use

Categorisation	No of Students	Percentage (%)
1. Innovators	407	39.3
2. Early users/early majority	496	47.9
3. Late majority/the Laggards	133	12.8
Total	1036	100.0

The distribution of students by GAI use, as indicated in Table 2, shows that the majority fall within the early users/early majority category (47.9%), indicating that most students are quick to recognise and integrate GAI into their learning practices as the technology becomes available. A considerable proportion (39.3%) are innovators, actively engaging with or even developing new applications of GAI, which underscores a strong culture of experimentation and forward-thinking among students. However, a smaller group (12.8%) represents the late majority/laggards, who are slower to use, due to scepticism, lack of awareness, or limited technical confidence. This pattern suggests a progressive adoption curve among students, where innovation and early uptake dominate, positioning them as key drivers of GAI use in learning, while highlighting the need for targeted support to bring late adopters on board.

Table 3:
 Students' Decision to Use GAI for Instruction

S/N	Items	Mean (x)	S. D.
1.	I intend to use generative AI tools because I believe they will enhance my academic performance.	2.62	1.472
2.	I have decided to use generative AI tools after considering their usefulness to my studies.	2.42	1.451
3.	I feel encouraged to use generative AI because my instructors and peers support its use.	2.26	1.386
4.	I have decided to use generative AI despite concerns about potential plagiarism.	2.08	1.366
5.	I trust that generative AI tools provide correct and reliable information for my coursework.	2.21	1.397
6.	I have decided not to use generative AI tools due to concerns about data privacy and security.	2.44	1.256
7.	I have weighed the benefits of generative AI against its risks before making my decision.	1.92	1.279
8.	I have decided to use generative AI because it is easy to learn and use	2.26	1.414
9.	I am confident that using generative AI will save me time and effort in completing assignments.	2.30	1.446
10.	I have decided to use generative AI tools for my coursework	2.16	1.405
Grand Mean		2.28	

The findings on students' decision to use GAI for instruction reveal a cautious but low inclination, with a grand mean ($\bar{x} = 2.28$). The strongest driver of their decision is the belief that GAI will enhance academic performance ($\bar{x} = 2.62$), suggesting that performance gains remain a primary motivator. Similarly, students acknowledge GAI's usefulness to their studies ($\bar{x} = 2.42$) and are willing to adopt it despite concerns about data privacy ($\bar{x} = 2.44$), reflecting a utilitarian perspective where perceived academic benefits outweigh potential risks. However, the modest mean scores indicate that while students recognise GAI's potential, their decisions are not yet grounded in full confidence but rather in a pragmatic evaluation of immediate benefits.

At the same time, students show hesitancy rooted in trust and ethical concerns. They report low confidence in the correctness and reliability of GAI outputs ($\bar{x} = 2.21$), as well as a reluctance to fully dismiss plagiarism risks ($\bar{x} = 2.08$). The lowest-rated factor, students weighing benefits against risks before making decisions ($\bar{x} = 1.92$), shows that many use GAI without deeply reflecting on its long-term implications. This finding suggests that students' use of GAI is more impulsive or experimental than strategic, raising concerns about ethical blind spots and academic integrity. Their decision-making process is shaped by perceived utility rather than critical awareness of risks, highlighting a gap between use motivation and responsible adoption.

The role of social and contextual influences also appears limited in shaping student decisions. Support from



instructors and peers ($x = 2.26$) and the ease of learning/using GAI ($x = 2.26$) play a role but are not strong determinants. Likewise, students express only moderate confidence that GAI saves them time and effort ($x = 2.30$) and modest overall commitment to using it for coursework ($x = 2.16$). This shows that external encouragement and technological ease are secondary compared to the perception of direct prioritising benefits. Taken together, the results depict students as utility-driven but risk-aware users, making decisions that prioritise performance outcomes while inconsistently addressing ethical and trust-related challenges.

7. Testing of Hypotheses

The results of the hypotheses tested in this study are presented in subsequent tables. All hypotheses were evaluated at a significant level of 0.05.

Hypothesis One

H01: There is no significant difference in the decision to use GAI for instruction based on students' categories.

The Analysis of Variance (ANOVA) of students' categories and the decision to use GAI for instruction are shown in Table 4

Table 4:

Analysis of Variance (ANOVA) of Students' Categories and Decision to Use GAI for Instruction

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.381	2	2.191	2.894	.056
Within Groups	781.786	1033	.757		
Total	786.167	1035			

The ANOVA result shown in Table 4 showed an F-value of 2.894 with a $p = .056$, which is slightly above the conventional threshold of 0.05. This means that the null hypothesis, which stated that there is no significant difference in the decision to use GAI for instruction based on students' categories, was not rejected. In other words, students' decisions to use GAI for instruction did not differ significantly across the three adoption categories (innovators, early majority, and late majority/laggards). However, the p-value (0.056) was marginally above the significance level of decision-making, suggesting that while the statistical difference was not strong enough to be conclusive, there was a near-significant trend that could imply subtle variations in decision-making between categories. These findings highlighted that although students, regardless of their adoption stage, shared similar decision patterns in using GAI, innovators and early users demonstrated slightly higher tendencies towards use compared to late adopters, but not to a statistically significant degree.

Hypothesis Two

H02: There is no significant difference in students' use of GAI for instruction based on university ownership. The t-test analyses of students' use of GAI for instruction based on university ownerships are shown in Table 5

Table 5: Difference in Students' Use of GAI based on University Ownership

University Ownership	Students N	\bar{x}	SD	df	t	Sig. (2tailed)
Federal Univ.	487	1.87	.498	1034	-5.654	0.001
State Univ.	549	2.04	.7376			

The analysis in Table 5 revealed that university ownership significantly shaped students' use of GAI. Students in state universities reported higher levels of adoption ($\bar{x} = 2.04$, $SD = 0.73$) than their federal university counterparts ($\bar{x} = 1.87$, $SD = 0.49$), and this difference was statistically significant ($t = -5.65$, $p < 0.05$). Thus, the null hypothesis was rejected. This suggested that state university students were more actively integrating GAI into their academic practices.

8. Discussion

This study reinforced earlier scholarly literature of Assad (2024, p. 2) and Johnston *et al.* (2024, p. 2) that positioned students as early adopters of emerging technologies, leveraging tools like ChatGPT, Perplexity, and Gemini to streamline coursework, enhance efficiency, and experiment with new learning practices. Furthermore, the study reflected wider tensions in the use of technology between innovation and regulation. Students' willingness to experiment aligned with Rogers' (2003, p. 5) diffusion of innovations theory, which suggested that early adopters prioritised utility and experimentation over risk.



This explanation might include greater institutional flexibility, resource constraints that encouraged reliance on GAI, or different pedagogical expectations between state and federal institutions. Overall, students' decision to use GAI was shaped by university type, leading to a rejection of the null hypothesis.

9. Conclusion

The study highlighted the unevenness in adoption categories across demographics, where institutional ownership introduced complex dynamics. This divergence underscored the need for differentiated institutional interventions and equity-driven strategies that support students' confident and inclusive use of GAI.

10. Recommendations

1. It was recommended that universities invest in curricular development and integration to deepen students' learning and performance.
2. Universities should share experiences, strategies, and policies on GAI use to harmonise practices across ownership types, reducing inconsistencies and strengthening system-wide innovation.
3. Universities should also design targeted and equity-driven strategies that support students' confident and inclusive use of GAI.

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