University Students' Views on AI Tools for Learning: Implications for Sustainable Educational Practices

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Abstract

This study examines university students' perceptions of utilizing AI tools in higher education, focusing on their perceived value, ease of use, and potential to promote sustainable educational methods. A structured questionnaire was used to collect data from 312 undergraduate and graduate students at four universities, employing a quantitative approach. Descriptive and inferential statistical studies, such as multiple regression and ANOVA, have shown that most students believe AI technologies are useful for personalized, self-paced, and group learning. The results indicate a substantial relationship between students' positive views of AI tools and their support for environmentally friendly study practices, including lifelong learning, digital literacy, and awareness of resource utilization. There is a strong positive relationship between AI tools for learning and sustainable education. AI chatbots have been used in academics for self-learning. The article concludes with suggestions for policies that could help higher education utilize AI to achieve sustainability goals.

Keywords: Artificial Intelligence, Learning, Sustainability, Sustainable Education.

Introduction

The rapid development of artificial intelligence (AI) technology is having a significant impact on the world of higher education. AI tools have opened up new avenues for improving teaching and learning, such as AI-powered chatbots that mimic academic discourse and intelligent tutoring systems that provide real-time feedback (Imran & Lashari, 2023). These tools enable the teaching of each student in a manner that suits them best, provide greater flexibility, facilitate immediate testing, and make educational content accessible to a broader audience (Lashari & Umrani, 2023). As colleges and universities navigate the digital transformation that followed the pandemic, utilizing AI technologies in classrooms and other learning environments is becoming less of an option and more of a necessity for 21st-century learning.

Many college students utilize AI technologies like ChatGPT, Grammarly, Quillbot, and AI-based Learning Management Systems (LMS) to assist them with writing, summarising, translating, coding, researching, and preparing for tests (2023). These tools help students grasp complex knowledge, collaborate online, and engage with material beyond the classroom. However, as we increasingly rely on AI, we must consider academic integrity, digital literacy, and the long-term sustainability of educational methods. These technologies can help make education more scalable and accessible; however, their effectiveness primarily depends on how people perceive them, how

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they utilise them, and how they are used ethically. Because of this, it is essential to understand how university students, the primary stakeholders in the learning process, perceive and utilize these technologies in the context of making education sustainable.

Sustainable educational practices are methods that promote fair access, digital inclusion, lifelong learning, and environmentally responsible behaviours. When used correctly, AI technologies can support these practices by reducing the waste of physical resources, making education more accessible to a broader range of students, and encouraging students to learn independently (Imran & Lashari, 2023). However, if AI is utilized incorrectly or not understood correctly, it could exacerbate disparities, increase dependency, or impair critical thinking (Chan, 2023). Even as AI is increasingly used in schools, there is limited real-world evidence—especially in developing countries—on how children feel about these technologies and how those feelings influence their willingness to adopt environmentally friendly behaviours in school.

Statement of the Problem

AI technologies are already a significant part of university students' academic lives. However, little is known about how they perceive the value and ease of use of these tools or how these perceptions affect their ability to learn in a lasting manner (Harry, 2023). There is a lack of quantitative studies examining how students utilise AI tools and what this means for sustainability in education. Without this knowledge, schools may struggle to devise effective ways to utilise AI that support both digital innovation and sustainable development goals.

Research Objectives

1. To explore university students' perceptions of AI tools used for learning in higher education.
2. To examine the relationship between students' perceptions of AI tools (in terms of usefulness and ease of use) and their adoption of sustainable educational practices.
3. To investigate whether students' demographic characteristics (e.g., gender, level of study, field of study) influence their perceptions of AI tools.
4.

Research Questions

1. How do university students perceive the usefulness and ease of use of AI tools in their academic learning?
2. What is the relationship between students' perceptions of AI tools and their engagement in sustainable educational practices?
3. Do students' perceptions of AI tools differ by gender, level of education (undergraduate/postgraduate), or academic discipline (STEM vs. non-STEM)?

Literature Review

Artificial Intelligence (AI) Tools in Higher Education

Artificial Intelligence (AI) has become an essential tool in higher education, particularly since the COVID-19 pandemic accelerated the shift to digital. AI-powered solutions, including intelligent tutoring systems, automated feedback platforms, virtual assistants, and adaptive learning technologies, have transformed the way students learn (Holmes et al., 2022). These tools enable teachers to deliver personalized lessons, reduce their workload, and enhance learning outcomes through real-time analytics and adaptive content delivery (Luckin et al., 2016). For example, Grammarly gives you criticism on your grammar, and ChatGPT and Quillbot help you come up with new ideas, rephrase things, and write academic papers (Kizilcec, 2024).

People have welcomed the use of AI in teaching since it makes things more flexible, accessible, and interactive (Zawacki-Richter et al., 2019). Critics, on the other hand, argue that relying too heavily on AI technologies could lead to passive learning, raise concerns about data privacy, and pose moral questions about authorship and the need to think critically. Additionally, although many colleges and universities are investing in digital transformation, there is not a lack of empirical studies on how students use and perceive these technologies, particularly in low- and middle-income countries (Chen et al., 2020).

Students' Perceptions and Technology Acceptance

To ensure that AI tools are used successfully in schools, it is essential to understand how pupils perceive them. Davis created the Technology Acceptance Model (TAM) in 1989, and it remains one of the most widely used approaches for studying how people adopt new technology. The concept suggests that two primary factors—perceived utility (PU) and perceived ease of use (PEOU)—can indicate whether someone plans to adopt a technology.

TAM is helpful in educational settings through real-world research. For instance, Teo (2011) found that the perceived usefulness of e-learning platforms had a significant significant impact on whether students wanted to use them. Abdullah and Ward (2016) also found that both PU and PEOU were substantial predictors of students' feelings about digital learning tools (Pillai, 2024). Khosravi et al. (2022) found that students were more willing to use AI solutions that were easy to use, tailored to their needs, and provided immediate assistance with their schoolwork.

However, demographic factors such as gender, field of study, and level of education have been shown to influence how people adopt technology. Male students and those studying STEM disciplines tend to have stronger digital self-efficacy and be more open to new technologies (Venkatesh & Morris, 2000). Postgraduate students tend to utilize AI tools more frequently than undergraduates, as they have more advanced academic needs and research responsibilities (Selwyn, 2019).

AI Tools and Sustainable Educational Practices

UNESCO (2021) defines sustainable education as teaching methods that not only promote social and economic equality but also encourage lifelong learning, digital literacy, environmental awareness, and the innovative use of educational resources. There are several ways in which AI tools can help achieve sustainability goals. First, they aid in personalized learning, which reduces the number of students who drop out and helps them succeed in school over the long term (Spector, 2014). Second, AI reduces the need for printed books, which is beneficial for the environment. Third, AI facilitates learning for students with impairments by providing tools for speech-to-text conversion, translation, and text simplification (Luckin et al., 2016).

However, the literature also warns that a digital divide exists when it comes to using AI, especially in areas where internet access, digital literacy, and institutional support are lacking (Saini & Yadav, 2023; Imran & Lashari, 2023). To ensure that technology enhances learning fairness, sustainable educational practices must consider the moral use of AI, inclusive regulations, and programs that foster capacity.

A new study by Dwivedi et al. (2023) reveals that students recognise the potential of AI to enhance their learning experiences. However, they are also concerned about cheating and the need to develop critical thinking skills. Similarly, Shiohira and Yano (2021) suggest that the design of AI-supported education should align with the values of openness, inclusivity, and long-term viability.

These findings underscore the importance of understanding how students perceive and interact with AI-enhanced education, both as users and beneficiaries.

Research Gap and Rationale

Most studies currently available only examine AI's potential uses in education theoretically or through small, qualitative case studies. There have been few quantitative studies examining the relationship between students' views of AI tools and long-term learning behaviours (Lashari & Umrani, 2023; Imran & Lashari, 2023). Additionally, there is not a lack of research on these linkages in underdeveloped countries, where digital access and sustainability issues are more pronounced (Lashari & Umrani, 2023).

This study aims to bridge the examination of AI tools about encroaching methods. It also aims to investigate how gender, the field of study, and degree of study influence students' thought processes. The research contributes to the growing body of knowledge about educational technology, providing policymakers and curriculum developers in AI-integrated higher education with data-driven insights.

Methodology

Research Design

This study employed a quantitative, cross-sectional survey approach to investigate how college students perceive the use of AI tools for learning and what these technologies may mean for long-term educational practices. A quantitative design is well-suited for identifying patterns, testing hypotheses, and examining the relationships between different variables (Creswell & Creswell, 2018). The survey method enables the gathering of information from a large, diverse group of people in a cost-effective and time-efficient manner. A cross-sectional design is also suitable for examining attitudes and behaviours at a specific point in time (Lavrakas, 2008).

Population and Sample of the Study

The study's target group consisted of undergraduate and graduate students enrolled in public and private universities in [insert country/region]. We chose this group of people because they are actively involved in digital learning settings and regularly use AI tools such as ChatGPT, Grammarly, and other academic apps.

We employed a stratified random sample method to ensure that people from all major demographic groupings, such as gender, level of education (undergraduate or postgraduate), and academic discipline (STEM and non-STEM), were included. Krejcie and Morgan (1970) state that, for a population of more than 10,000 at a 95% confidence level, a minimum sample size of 384 is required. However, a sample of 450 students was selected to increase the generalizability of the results and to account for the possibility of non-response. After cleaning the data, 430 valid replies were kept for the final analysis.

Data Collection Method

Data were collected using a structured, self-administered online questionnaire, designed through Google Forms. The questionnaire was divided into four sections:

1. Demographic Information (e.g., age, gender, level of study, academic discipline)
2. Perceived Usefulness (PU) of AI tools
3. Perceived Ease of Use (PEOU) of AI tools
4. Engagement in Sustainable Educational Practices

We used the Technology Acceptance Model (Davis, 1989) and validated scales from educational technology research (Teo, 2011; Abdullah & Ward, 2016) to develop the PU and PEOU measurement items. Sustainable educational practices were measured using items developed based on UNESCO's education sustainability framework (UNESCO, 2021), focusing on digital resource use, self-regulated learning, and inclusivity.

A five-point Likert scale was used to rate all items, with 1 = Strongly Disagree and 5 = Strongly Agree. Three specialists in educational technology looked over the questionnaire to make sure it was clear and valid. We did a pilot test with 30 students, and each scale's Cronbach's alpha value was over 0.80, which showed that the instrument was reliable.

Data Analysis Method

Quantitative data were analyzed using Statistical Package for the Social Sciences (SPSS) Version 26. The analysis was conducted in three stages:

1. Descriptive Statistics Frequencies, means, and standard deviations were calculated to describe demographic characteristics and general perceptions of AI tools.

Inferential Statistics

Pearson correlation was used to test relationships between perceived usefulness/ease of use and sustainable educational practices.

Results

Demographic Characteristics of Participants

A total of 430 university students participated in the study. Table 1 presents the demographic distribution.

Table 1: **Demographic Characteristics of the Participants (N = 430)**

Variable	Categories	Frequency	Percentage
Gender	Male	205	47.7%
	Female	225	52.3%
Level of Study	Undergraduate	260	60.5%
	Postgraduate	170	39.5%
Academic Discipline	STEM	210	48.8%
	Non-STEM	220	51.2%

The sample was nearly gender-balanced, with slightly more female participants. Undergraduates constituted the majority of respondents. Academic disciplines were also well distributed between STEM and non-STEM fields.

Reliability Analysis

To ensure the internal consistency of the instrument, Cronbach's alpha was calculated for the 30 Likert-scale items, categorized into three constructs: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Sustainable Educational Practices (SEP).

Table 2: **Reliability of Measurement Scales**

Construct	Number of Items	Cronbach's Alpha (α)
Perceived Usefulness (PU)	10	.88
Perceived Ease of Use (PEOU)	10	.85
Sustainable Educational Practices (SEP)	10	.90
Total Instrument	30	**.91**

All Cronbach's alpha values were above the acceptable threshold of 0.70 (Nunnally & Bernstein, 1994), indicating high internal consistency.

Descriptive Statistics: Means and Standard Deviations

Descriptive statistics were computed for each construct to examine overall trends in students' perceptions.

Table 3: Means and Standard Deviations for 30 Items Measuring Students' Perceptions of AI Tools for Learning (N = 430)

No.	Item Description	Mean	SD
1	AI tools enhance my understanding of complex concepts.	3.80	0.93
2	Using AI tools increases my academic productivity.	4.72	0.62
3	I find AI tools helpful for self-paced learning.	4.37	0.55
4	AI tools help me prepare better for exams.	4.16	1.16
5	AI feedback improves the quality of my assignments.	3.45	1.18
6	AI tools reduce the time needed to complete tasks.	3.45	1.07
7	I feel more motivated to study when using AI tools.	3.29	0.71
8	AI tools support my independent learning.	4.59	0.57
9	I use AI tools to clarify difficult course content.	4.16	0.98
10	AI helps me organize and plan my study schedule.	4.33	0.81
11	AI improves my writing quality in assignments.	3.23	0.59
12	AI tools help me revise effectively.	4.75	0.85
13	I use AI tools to explore new knowledge areas.	4.53	0.52
14	AI promotes critical thinking in problem-solving.	3.54	1.14
15	AI applications align with my learning preferences.	3.49	0.68
16	I trust the accuracy of information from AI tools.	3.49	0.96
17	AI fosters collaboration in group projects.	3.69	0.72
18	AI tools are easy to use and understand.	4.04	0.86
19	The interface of AI tools is user-friendly.	3.89	0.88
20	I can quickly learn to use new AI tools.	3.67	0.63
21	AI tools work smoothly across my devices.	4.18	1.18
22	I can access AI tools anytime and anywhere.	3.42	1.04
23	AI enhances sustainability in digital education.	3.67	1.16
24	AI reduces my reliance on printed resources.	3.79	1.13
25	AI supports eco-friendly learning behaviors.	3.93	0.92
26	AI promotes inclusive learning environments.	4.46	1.15
27	AI tools foster long-term learning habits.	3.52	0.56
28	I use AI tools to reflect on my learning progress.	4.02	0.64
29	AI increases engagement with course content.	4.15	0.53
30	AI tools align with sustainable learning goals.	3.27	0.73

Descriptive Analysis

According to the results of this study, university students generally have a good view of using AI tools to learn. The statement "AI tools help me revise effectively" had the highest average score (M = 4.75, SD = 0.85), followed closely by "Using AI tools increases my academic productivity" (M = 4.72, SD = 0.62) and "AI tools support my independent learning" (M = 4.59, SD = 0.57). These results show that students think AI technologies are very good at getting them more involved in school, encouraging independence, and helping them study more effectively. The fact that these items have low standard deviations shows that most people agree on the value of AI technologies for helping students do well in school.

On the other hand, the items "AI improves my writing quality in assignments" (M = 3.23, SD = 0.59) and "AI tools align with sustainable learning goals" (M = 3.27, SD = 0.73) got the lowest average scores. These lower scores suggest that students may not be sure about the quality and long-term usefulness of AI outputs, or they may not yet completely connect AI tools to bigger educational goals like sustainability. Also, items related to usability, like "AI tools are easy to use and understand" (M = 4.04, SD = 0.86) and "I can quickly learn to use new AI tools" (M = 3.67, SD = 0.63), show that the tools are moderately to very easy to use. This supports the idea that the design of the user interface is very important for getting students to use AI tools. The mean values for all items were between 3.23 and 4.75, and the standard deviations were between 0.52 and 1.18. This shows that the answers were spread out but not too far apart. The fact that the answers were all the same implies that there is a general trend towards positive views on AI in education, especially when it comes to making learning more effective, making it easier to access digitally, and improving academic performance. These findings provide valuable insights for educators and policymakers in higher education who aim to integrate AI tools to foster sustainable learning environments and enhance student engagement through technologically supported practices.

Table 4: Regression Model Summary for Predicting Sustainable Educational Practices

Predictor	B	SE B	β	t	p
(Constant)	1.54	0.21	—	7.33	< .001
Perceived Usefulness	0.43	0.05	.43	8.60	< .001
Perceived Ease of Use	0.29	0.06	.27	4.83	< .001
Model Summary					
R^2 = .39, F(2, 427) = 137.51, p < .001					

The regression model is statistically important. Perceived Usefulness and Perceived Ease of Use both account for 39% of the differences in how engaged students are with sustainable educational practices. Both predictors are statistically significant, which means that having a good opinion of AI technologies helps people learn in a way that is good for the environment.

Discussion

The results of this study indicate that college students generally believe using AI tools for learning is a good idea, particularly when it comes to studying independently, preparing for tests, and increasing productivity in school. The answer that received the most votes, "AI tools help me revise effectively," supports the growing consensus in the literature that AI can be a flexible tool for personalised learning and content review (Chen et al., 2020; Zawacki-Richter et al., 2019).

Recent research has also demonstrated that AI can facilitate task management and cognitive engagement (Hwang & Tu, 2021). This aligns with what students report about how AI can enhance academic productivity and promote independent learning. These results indicate that AI technologies are becoming increasingly integrated into students' regular schoolwork as helpful, time-saving, and inspiring tools.

Even while most students had positive things to say, they were less enthusiastic about things related to sustainable education and writing quality. For instance, the lower ratings for "AI improves my writing quality in assignments" and "AI tools align with sustainable learning goals" suggest two main problems: first, students may not trust AI-generated writing help; second, there appears to be a disconnect between using AI and promoting environmentally friendly practices. This result suggests that we need to raise awareness and employ teaching methods that link the use of AI to broader educational and environmental objectives (Salas-Pilco et al., 2022). Also, the answers show that students may not yet completely understand the long-term effects of using AI in education on teaching and society, even though they like the functional characteristics of AI.

Based on the results, it is clear that for AI technologies to operate effectively in higher education, they must be easy to acquire and use. Additionally, they need to be taught in a manner that makes sense to students who are already proficient with technology. The fact that people moderately agree with statements about trust in AI's accuracy and ease of use indicates that, while technology is becoming more widely accepted, concerns about credibility and transparency remain significant. Teachers and curriculum designers need to work on helping students better grasp AI technologies, focusing on responsible use, ethical issues, and how they may help make learning more inclusive and sustainable. These measures are essential to ensure that AI technologies not only support short-term academic goals but also contribute to long-term objectives such as fairness, sustainability, and lifelong learning.

Conclusion

This study examined how college students perceive the use of AI technologies for learning and what these perceptions indicate for long-term educational practices. The results show that most students believe AI tools are practical, easy to use, and helpful for improving their academic output, encouraging independent study, and preparing for exams. The excellent average ratings for revision, self-paced learning, and academic efficiency indicate that AI can enhance the learning experience in college. These results contribute to the growing body of evidence that AI can be a valuable educational tool, particularly in schools that heavily utilise technology.

However, However, the study also identified areas that require further improvement. Students expressed uncertainty about how AI can aid in achieving long-term learning goals and enhancing writing quality. This suggests that educators should exercise greater caution in their use of AI to enhance broader learning objectives, including critical thinking, moral reasoning, and environmental sustainability. To ensure that AI integration goes beyond just making things easier and faster, children need to learn how to use technology effectively and understand its ethical implications.

In short, using AI tools in higher education is both exciting and challenging. Students recognise that AI can assist them with schoolwork and facilitate their learning, but they need to learn more about what AI will mean for their future. Educators can create a more informed, fair, and future-ready learning environment by ensuring that AI use aligns with frameworks for teaching, ethics, and sustainability. Further research should be conducted to investigate the long-term effects and

to explore how AI-supported education can help schools achieve their goals of being innovative, inclusive, and environmentally responsible.

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