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TRUST AND ETHICAL CONCERNS AS PREDICTORS OF ARTIFICIAL INTELLIGENCE ADOPTION AND LEARNING OUTCOMES IN HIGHER EDUCATION

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ABSTRACT

Artificial intelligence (AI) is revolutionizing higher education through increased personalization in learning, education support, and engagement. Nonetheless, the adoption of AI technology requires the perception of students, especially concerning issues of trust, perceived usefulness, satisfaction, and ethics. This paper assesses the correlation of trust and ethics with AI adoption, investigates the correlation of AI adoption and learning results, and determines the determinants of AI adoption and improvement in learning in higher education students. The quantitative analysis for this study involved the use of AI Tools Usage Analysis in Education dataset obtained from Kaggle. Data from 505 undergraduate and graduate students, based on predetermined selection criteria, were used for the study. The descriptive statistics, Pearson correlation coefficient, and multiple linear regression were used in the analysis, using $p < 0.05$ for statistical significance. Privacy and plagiarism ethical issues were identified as significant negative predictors of AI usage, while usefulness and satisfaction with the tool positively predicted the intention to use it. Trust in the system, intention to adopt the technology, usefulness, and satisfaction had a positive impact on learning enhancement, while ethical concerns negatively impacted the process. In general, student perception was more important in determining the extent of AI usage and the outcomes of the learning experience than usage characteristics.

1. Introduction

Artificial intelligence (AI) technology has turned around the entire education industry quickly, impacting teaching, learning processes, evaluation procedures, and academic decisions making. The rise of new generations of AI such as ChatGPT, Google Gemini, and Microsoft Copilot has made it possible for students to receive personal assistance while studying, feedback automation, content creation, and problem solving. This technological advancement is gaining popularity in higher education institutions because it helps improve the quality of education as well as promote data-based teaching and learning procedures (Al Najdwi et al., 2024). In addition to the impact on learning, AI is proving to be a powerful solution that can contribute significantly to promoting sustainable education by enabling innovative teaching methods and personalized learning possibilities (Shwedeh et al., 2024). Empirical findings also indicate that there is a positive correlation between the use of AI and academic achievement and learning effectiveness, especially if the students find AI applications useful and supportive to their learning objectives (Alarefi & Alharbi, 2025). Trust is consistently identified as a crucial factor that fosters students' willingness to interact with AI systems in education (Razzouki et al., 2025), and thus, it plays a pivotal role in the successful integration of AI systems in education. Likewise, Research on technology acceptance has revealed that perceived usefulness, ease of use and satisfaction with the use of the technology play a major role in acceptance (Alshammari et al., 2025). However, the swift integration of AI has also brought up significant concerns about fairness, accountability, transparency, and ethical utilization, especially in terms of privacy, academic integrity, and responsible decision-making (Memarian & Doleck, 2023). These are particularly pertinent in the context of educational development, where trust and privacy have emerged as critical additional factors beyond traditional TAM considerations for the adoption of AI (Rana et al., 2024). In addition, trust in AI tools remains a key factor in the adoption of AI-supported educational technologies over the long term (James et al., 2025).

Although more and more literature exists on the use of AI in HE institutions, there are still some crucial gaps in the knowledge. Prior research has largely concentrated on conventional technology acceptance factors and underemphasized ethical issues of privacy, academic integrity, and responsible use of AI (Marín et al., 2025). While recent studies have integrated trust into technology acceptance models, there is still only limited research exploring the effects of both trust and ethical considerations on the intention to adopt AI (Balaskas et al., 2025). Likewise, studies on AI usage have often focused on cooperative learning or institution-level AI deployment, without assessing whether AI use leads to improvements in learning outcomes

(Alyoussef et al., 2025). Other studies that have investigated this topic also have focused on a specific institution or used a specialized AI application like an educational chatbot, which makes the results of these studies less applicable to other higher education settings (Mohd Rahim et al., 2022). Moreover, there is a lack of evidence over time (longitudinal) to see how AI adoption behavior changes, and secondary analyses of big educational datasets, which could produce more generalizable evidence is still relatively rare (Polyportis, 2024).

With the rising significance of AI in higher education, the interest in identifying factors that foster responsible and effective AI adoption has grown. While earlier research has found AI technologies are gaining traction in universities, more findings are required to better understand the joint impact of trust and ethics issues on adoption in various educational settings (Nagy et al., 2024). While the quantitative studies have identified the significance of the variables in technology acceptance, the new applications of AI need to be continually examined using wider and more modern data sets (Chatterjee & Bhattacharjee, 2020). Furthermore, the use of AI in the education sector holds significant potential for improving teaching and learning outcomes as well as boosting institutional efficiency; however, its implementation must be guided by ethical considerations and trust among users. This study will help to answer these questions by examining a big publicly-available educational dataset to identify indicators of the likelihood of AI adoption and learning gains in higher education students, and provide evidence to support institutional policies and strategies for using AI responsibly. Moreover, the study presents a combination of learning improvement and intention to adopt AI, adding to the growing body of evidence regarding the effectiveness of AI in education and complementing recent systematic reviews on the role of AI in predicting and improving student performance (Ab Rahman et al., 2025).

Research Objectives

1.To evaluate the association between trust and ethical concerns with AI adoption among higher education learners.

2.To determine the relationship between AI adoption and learning outcomes.

3.To identify significant predictors of AI adoption and learning outcomes using multiple regression analysis.

2. Methodology

2.1 Study Design

This research investigated the variables associated with the use of AI by higher education students and their results through a quantitative cross-sectional research methodology based on the analysis of secondary data. This research looked into an openly available dataset that included information about students' perception of AI technology, its usage, moral issues, satisfaction, and academic performance.

2.2 Data Source

This research used the "AI Tools Usage Analysis in Education" dataset, a freely available dataset from the Kaggle data repository (Vision LangAI, 2016). This dataset contains data about the educational level of the participants, their academic domain, trust in AI, usefulness, ease of use, ethical issues of privacy and plagiarism, behavior with AI, satisfaction, adoption intention, pre-test and post-test scores, which makes it relevant to investigate factors of AI adoption and learning in higher education.

2.3 Study Population and Data Selection

The initial database consisted of 1,000 individuals at various levels of education. In this research, the subjects selected were undergraduate and graduate students, and the rest was omitted based on the set inclusion criteria. After selecting data, a total number of 505 individuals from higher education, belonging to different academic fields, were used in the analysis.

2.4 Study Variables

The dependent variables were AI adoption intention and learning improvement, where learning improvement was measured by the alteration among post-test and pre-test scores. The independent variables were trust score, ethical concerns on privacy and plagiarism, usefulness score, ease of use score, frequency of AI use, average session time, total number of tasks performed by AI, satisfaction score, education level, and subject field. In addition to these independent variables, the pre-test score was also added as a covariate in the model of learning improvement.

2.5 Statistical Analysis

Data entry were entered into MS Excel. Frequency and percentage distributions were used for categorical data, while mean and standard deviation were used for continuous data. Pearson correlation analysis was performed to determine the relationship between the study variables, after which multiple linear regressions were performed to determine predictors of intention of adopting AI and improvement in learning. Evaluation of the model performance was through

regression coefficients, standard errors, t-value, p-values, R^2, adjusted R^2, and F-values, with statistical significance defined at $p < 0.05$.

3. Results

3.1 Characteristics of the Study Population

In all, 505 participants from the higher education sector were recruited in the study based on the eligibility criteria set out at the beginning of the research. The study sample included undergraduate and graduate students from various subjects, such as science, engineering, business studies, humanities, social sciences, education, and law. Most of the study participants were undergraduate students. The specific distribution of the participants based on education level and subject is given in Table 1.

Table 1. Characteristics of the Study Population (N = 505)

Variable	Category	n	%
Subject area	Computer Science	42	8.3
	Law	41	8.1
	Education	41	8.1
	Chemistry	39	7.7
	Economics	36	7.1
	Biology	34	6.7
	Psychology	34	6.7
	Art and Design	33	6.5
	Engineering	32	6.3
	History	32	6.3
	Business	31	6.1
	Physics	30	5.9
	English	29	5.7
	Sociology	28	5.5
	Mathematics	23	4.6

Participants in the study came from both undergraduate and graduate schools. Figure 1 shows the proportionate distribution of participants by educational attainment.

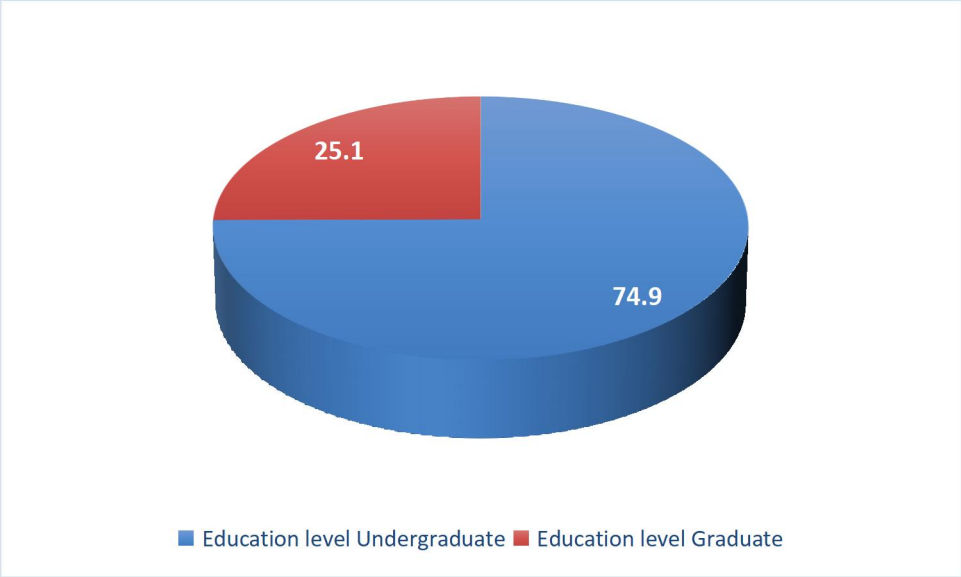

Figure 1. Distribution of Participants by Education Level

As illustrated in Figure 1, it can be seen that undergraduates comprised the majority in the sample population, with graduate students forming a small percentage of the sample population. This implies that the results of the study are largely based on the views of undergraduate students as well as graduate students.

3.2 Descriptive Statistics of Study Variables

The descriptive analysis indicated generally moderate to high scores for trust, perceived usefulness, perceived ease of use, AI adoption intention, satisfaction, and ethical concerns related to privacy and plagiarism among higher education learners. Furthermore, the improvement between pre-test and post-test scores suggested positive learning gains following AI-assisted learning activities. The overall distribution of the mean scores for the study variables is illustrated in Figure 2.

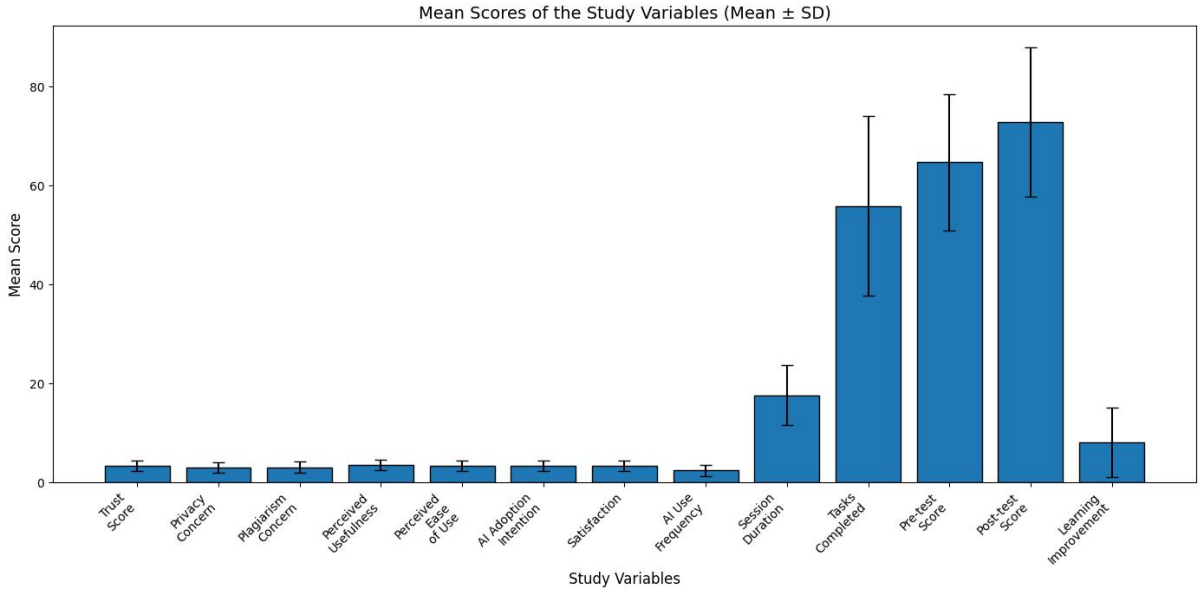

Table 2. Descriptive Statistics

Figure 2 reveals the distribution of the average scores of the study variables. The perception-based constructs have shown rather steady mean values, but the comparison of pre-test and post-test scores suggests a general increase in the learning performance after AI-assisted learning. The error bars included are the variability of the responses of the participants in each variable.

3.3 Correlation Analysis

Pearson correlation analysis showed that there were significant relationships among the main variables of this investigation. Results indicated that trust had positive relationships with AI adoption intention and learning improvement, while ethical issues regarding privacy and plagiarism had negative relationships. Perceived usefulness and perceived ease of use had positive relationship with AI adoption intention and learning improvement. Additionally, learning improvement was positively associated with AI adoption intention, suggesting that increased acceptance of AI technologies had a positive impact on learning improvement. A full Pearson correlation matrix is shown in table 3.

Table 3. Pearson Correlation Matrix of the Major Study Variables

Variable	Trust	Privacy	Plagiarism	PU	PEOU	Adoption	Improvement
Trust score	1.000	-	-	-	-	-	-
Ethical concern	−0.306	1.000	-	-	-	-	-

(Privacy)							
Ethical concern (Plagiarism)	−0.294	0.299	1.000	-	-	-	-
Perceived usefulness	0.300	−0.209	−0.306	1.000	-	-	-
Perceived ease of use	0.245	−0.275	−0.264	0.321	1.000	-	-
AI adoption intention	0.252	−0.322	−0.344	0.349	0.251	1.000	-
Learning improvement	0.285	−0.317	−0.342	0.304	0.287	0.353	1.000

3.4 Predictors of AI Adoption

To find factors related with the intention to adopt AI, multiple linear regression analysis was used. The overall regression model was substantial and accounted for a moderate amount of variation in adoption intention for AI. Following controlling the other studied variables, ethical issues (related to privacy and plagiarism) were found to be negatively substantial predictors of AI adoption intention, while perceived usefulness and satisfaction were found to be positively significant predictors. While the results showed positive relationship among trust and AI adoption intention, the trust variable was not a statistically significant independent predictor once other variables included in the model were controlled. AI adoption intention did not differ significantly by education level, subject area, how often they use AI, how long they use it, tasks they completed, or perceived ease of use. The results of the detailed regression are shown in Table 4.

Table 4. Factors Associated with AI Adoption Intention

Predictor	Regression coefficient (B)	Standard Error	t-value	p-value
Trust score	0.048	0.045	1.071	0.285
Ethical concern (Privacy)	−0.160	0.043	−3.696	<0.001
Ethical concern	−0.152	0.042	−3.633	<0.001

(Plagiarism)				
Perceived usefulness	0.178	0.044	4.074	<0.001
Perceived ease of use	0.034	0.044	0.777	0.437
AI use frequency/week	−0.026	0.037	−0.703	0.483
Average session duration	−0.004	0.007	−0.622	0.534
Tasks completed	0.003	0.002	1.405	0.161
Satisfaction score	0.204	0.043	4.733	<0.001
Education level	0.029	0.095	0.307	0.759
Subject area	0.000	0.010	0.031	0.975

Model statistics: $R^2 = 0.267$; Adjusted $R^2 = 0.251$; $F = 16.36$; $p < 0.001$

3.5 Predictors of Learning Outcomes

Futher multiple linear regression model was performed to find the predictors of learning improvement. The model was statistically substantial and accounted for a moderate amount of variance in learning improvement. Trust was significantly and positively associated with learning improvement, as well as AI adoption intention, perceived usefulness and satisfaction, while privacy and plagiarism concerns were significantly and negatively associated with learning improvement. The perceived ease of use variable was close to being statistically significant but failed to meet the predetermined significant level. After controlling for these factors, there was no independent association between AI use frequency, session duration, tasks completed, education level, subject area, and pre-test scores with learning improvement. Results of detailed regressions are shown in Table 5.

Table 5. Factors Associated with Learning Improvement

Predictor	Regression coefficient (B)	Standard Error	t-value	p-value
Trust score	0.597	0.292	2.043	0.042
Ethical concern (Privacy)	−0.730	0.284	−2.575	0.010
Ethical concern (Plagiarism)	−0.771	0.278	−2.778	0.006
AI adoption intention	0.825	0.292	2.821	0.005
Perceived usefulness	0.577	0.287	2.013	0.045
Perceived ease of use	0.550	0.284	1.936	0.053
AI use frequency/week	0.110	0.240	0.459	0.646

Average session duration	−0.004	0.044	−0.082	0.935
Tasks completed	−0.002	0.015	−0.144	0.886
Satisfaction score	1.393	0.285	4.893	<0.001
Education level	0.918	0.616	1.492	0.136
Subject area	−0.059	0.063	−0.928	0.354
Pre-test score	−0.018	0.020	−0.936	0.350

4. Discussion

The present investigation explored the factors correlated with the use of AI and learning outcomes of students of higher education based on a secondary data. The results suggest that it is not demographic or use features that are more influencing in students' technology adoption, but perception about AI is. The study revealed that privacy and plagiarism were major factors holding students back from adopting AI technologies, while perceived usefulness and satisfaction were positive factors towards the adoption. While trust was associated with AI adoption, once other factors were accounted for, it was not an independent predictor, indicating that the impact of trust might be mediated by general perceptions of the effectiveness and usability of AI. The results highlight the need of considering students' trust in the accountable and beneficial use of AI in educational contexts when implementing AI integration successfully.

The study also indicated that learning improvement positively correlated with AI adoption intention, meaning that students with a high intention to adopt AI in their learning activities experienced greater improvement in their learning. Additionally, the perceived usefulness and satisfaction were also significant factors in learning improvement, indicating that AI technologies are more effective when students value their usefulness and find them satisfying their learning needs. Conversely, though privacy and plagiarism issues had a unfavourable impact on learning improvement, suggesting that ethical concerns may deter students from making full use of AI-supported learning. Interestingly, the education level, the academic field, the frequency of use of AI, the duration of the session and the number of tasks completed using AI were not significant independent predictors after adjustment. This result indicates that perceptions and attitudes of students towards AI might matter more than how often or how long they use AI, implying that it would be more beneficial to make positive user experiences with AI as a top priority instead of augmenting exposure to AI tools.

The findings of the current investigation confirm previous studies that found that usefulness, trust, and confidence in AI in learning technologies are important factors for the uptake of AI in

higher education. Other researchers have found that users are willing to embrace AI applications when they see the value in the education they can gain from them, and they gain confidence in the reliability of AI systems (Emon et al., 2023; Al-Abdullatif, 2024). The negative impact of privacy and plagiarism concerns identified in this study also aligns with the prior evidence which highlighted ethical concerns as one of the key challenges in responsible AI use in education (Ungerer & Slade, 2022). In addition, the positive correlation between the utilization of AI and enhancement in learning corresponds to several recent researches that have established the possibilities of generative AI tools for improving learner engagement, creativity, and efficacy (Shahzad et al., 2025). These results correspond to the approaches that focus on the necessity of finding a balance between technological advancements and ethical governance to ensure sustainable integration of AI in the healthcare industry (Khan et al., 2025). Moreover, the benefits in education observed in the current study are consistent with the findings made in other researches about the role of AI in facilitating learning experiences in higher education (Rahiman & Kodikal, 2024).

The results have numerous ramifications for institutions and policymakers attempting to apply AI in higher education in a suitable way. To encourage students' trust in AI, institutions need to make sure that there is transparency, privacy protection, and proper policies with regard to academic integrity and responsible use of AI. Additional faculty training, institution rules and regulations, as well as AI literacy programs can help enhance students' trust in AI and leverage the favourable effects of AI-assisted learning. Rather than solely focusing on the rise in the use of AI technology, institutions should consider improving students' perception of its usefulness and satisfaction since these factors had the strongest connection with AI adoption and learning outcomes.

It should be mentioned that this investigation had a number of drawbacks. First, the cross-sectional design of the secondary data used in the research does not allow making any causal conclusions. Self-reported measures can suffer from reporting bias. In addition, the analysis took into account only those variables that were included in the secondary dataset while neglecting other possible factors that might influence AI adoption. Future research should use experimental or longitudinal designs and control for further psycho-social, institutional and cultural factors to gain a deeper understanding of the long-term effects of AI uptake in varying higher education contexts and understand their effects on learning outcomes.

5. Conclusion

The purpose of this study was to comprehend the variables influencing AI use and learning outcomes in higher education. The results show that student perceptions of AI are central to the adoption of AI and educational performance. The ethical issues associated with privacy and plagiarism were noted as critical challenges affecting the adoption of AI, while professed usefulness and satisfaction had a positive impact on students' intention to use AI technologies. Trust was positively related with AI adoption, but was not a substantial predictor in the final model. Additionally, there was a positive relationship between AI adoption intention and learning improvement, suggesting that the increased acceptance of AI technologies may lead to better educational outcomes. Perceived usefulness and satisfaction were also some of the positive factors that influenced learning improvement while ethical issues were one of the negative factors that influenced learning improvement. This demonstrates that there should be much more than simply having access to AI tools in order to implement them successfully within the higher education context. The priorities of educational institutions in this regard would be to ensure clear AI governance, increase students' confidence in ethical use of AI, promote AI literacy and proficiency, as well as resolve ethical issues connected to privacy and academic integrity. Such an approach will help to maximize the incorporation of AI and learning effectiveness of AI-assisted teaching and learning. Overall, this investigation provides empirical proof of the necessity of the balance among technological development and ethical responsibility in order to maximize the potential of AI in higher education.

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