


The Relationship between Prospective Classroom Teachers' Acceptance of Generative Artificial Intelligence and their Ethical Use of Information Technologies

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Abstract

The rapid integration of generative artificial intelligence (GAI) tools into educational contexts has raised important questions regarding not only technology acceptance but also ethical considerations in technology use. In this context, the present study aims to examine the relationship between pre-service classroom teachers' levels of ethical use of information and communication technologies (ICT) and their acceptance of generative artificial intelligence. Employing a quantitative correlational research design within the descriptive model, the study was conducted with 337 pre-service classroom teachers selected through convenience sampling from two universities in Gaziantep, Türkiye. Descriptive statistics, Pearson product-moment correlation analysis, and hierarchical multiple regression analysis were used to analyze the data. The results revealed that pre-service classroom teachers demonstrated high levels of both ethical ICT use and acceptance of generative AI. A positive and moderate statistically significant relationship was found between ethical ICT use and generative AI acceptance. More specifically, ethical awareness, communication and respect, and intellectual property dimensions of ethical ICT use were positively associated with generative AI acceptance, whereas the cybercrime dimension was not significantly related. Hierarchical regression analysis showed that ethical ICT use was a significant associated with generative AI acceptance even after controlling for gender, age, grade level, and AI use frequency. Ethical ICT use was significantly associated with generative AI acceptance, with the final model accounting for 25.3% of the total variance. These findings indicate that ethical orientations toward technology are closely associated with pre-service teachers' openness to and acceptance of emerging AI technologies. This study contributes to the existing literature by empirically demonstrating that ethical ICT use is not merely a complementary skill but a key significantly associated with generative AI acceptance among future classroom teachers.



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Introduction

Artificial intelligence (AI) has increasingly become a focal point in educational research due to its potential to transform teaching and learning processes (Sperling, 2024). By enabling personalized learning experiences, supporting innovative instructional approaches, and enhancing student outcomes, AI technologies are reshaping educational environments at all levels (Seo et al., 2025). Among recent developments, generative artificial intelligence

(GAI)—defined as AI systems capable of producing human-like text, images, and other forms of content—has attracted particular attention for its potential use in instructional design, assessment, and academic support (Dağlı et al., 2025). Despite these opportunities, the effectiveness of AI integration in education is closely related to educators' readiness to use such technologies both competently and ethically (Bekdemir, 2024). Pre-service teachers, as future practitioners, play a critical role in determining how AI will be implemented in classroom settings. Sperling (2024) emphasizes that tools such as ChatGPT require future teachers to develop digital pedagogical competencies, integrate AI meaningfully into instruction, and address ethical challenges associated with AI use. Parallel to the rise of AI, the integration of information technologies into education has accelerated with the widespread use of computers, the internet, and mobile technologies (Ok et al., 2025). While these technologies have increased access to information and facilitated learning, they have also given rise to significant ethical concerns, including violations of privacy, misuse of personal data, copyright infringement, unauthorized access, and digital fraud (Uysal, 2006). Ethical use of information technologies encompasses responsible and conscious technology use, as well as issues related to digital security, privacy, accuracy of information, and respect for intellectual property (Toker, 2025).

Research has consistently highlighted the importance of ethical information technology use among pre-service teachers. Özbay et al. (2021) argue that ethical technology use is a key indicator of digital literacy and is essential for ensuring safe technology practices in educational contexts. Erdoğan et al. (2017) and Gök (2017) emphasize that the increasing reliance on digital technologies in teaching makes ethical awareness indispensable for teacher candidates. Studies also indicate that easy access to digital content has increased plagiarism and other unethical practices among students, reinforcing the need for ethical guidance in technology use (Tosun et al., 2016). The ethical dimensions of AI use in education further complicate this landscape. While AI offers benefits such as data-driven insights into student performance and support for instructional material development, concerns related to transparency, fairness, accountability, and bias remain prominent (Çelik, 2023; Şahin- Kölemen, 2024). The lack of explainability in AI decision-making processes and the potential for discrimination based on gender, race, or cultural background underscore the necessity of ethical frameworks for AI use (Oviedo-Trespalacios et al., 2023). Nguyen et

al. (2022) point out that ethical principles guiding AI use in education are still insufficiently defined, particularly in rapidly evolving contexts such as GAI applications.

Recent literature emphasizes the growing importance of AI literacy for teachers, students, and parents, enabling them to understand, interpret, and critically evaluate AI systems used in educational settings (Barnes et al., 2024). However, ethical acceptance of AI without sufficient reflection may increase the risk of uncritical adoption and misuse of these technologies (Barnes et al., 2024). The rise of GAI tools capable of producing academic content has intensified concerns about academic integrity, originality, and ethical behavior, particularly in higher education contexts (Dağlı et al., 2025). At both national and international levels, studies stress that AI applications in education should adhere to core ethical principles, including human agency and oversight, privacy protection, fairness, transparency, and accountability (Barnes et al., 2024; Varol, 2025). In this context, teacher education programs are increasingly recognized as critical spaces for fostering ethical awareness and responsible AI use among pre-service teachers (Mouta et al., 2024). As AI becomes an inevitable component of educational environments, understanding how future teachers perceive, accept, and ethically engage with these technologies has become a pressing research priority (Banaz & Demirel, 2024).

Relationship between Ethical Information Technologies Use and GAI Acceptance

Ethical use of information technologies (IT) and the acceptance of artificial intelligence in educational contexts are conceptually interconnected constructs. Ethical IT use reflects individuals' awareness, attitudes, and behaviors related to responsible technology use, including respect for privacy, intellectual property, digital security, and academic integrity (Erdoğdu et al., 2017; Özbay et al., 2021). Acceptance of GAI, on the other hand, refers to individuals' willingness to adopt, trust, and integrate AI systems capable of producing human-like content into learning and teaching processes (Zhang et al., 2023). Within educational settings, these two constructs are increasingly viewed as mutually influential rather than independent.

To understand the connection between these constructs, established technology adoption and behavioral theories provide a useful framework. The Technology Acceptance Model (TAM) suggests that individuals' acceptance of new technologies is largely shaped by their perceptions of usefulness and ease of use, which influence their attitudes toward adopting technological tools (Davis, 1989). However, individuals' technology-related

behaviors are also shaped by broader social and normative influences. In this regard, the Theory of Planned Behavior (TPB) explains that human behavior is guided by attitudes, subjective norms, and perceived behavioral control (Ajzen, 1991). These foundational perspectives have been further integrated within more comprehensive frameworks such as the Unified Theory of Acceptance and Use of Technology (UTAUT), which synthesizes constructs from several technology acceptance models and emphasizes key determinants of technology acceptance including performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003).

Within educational contexts, these theoretical insights suggest that prospective teachers who possess higher levels of ethical awareness are more likely to engage in responsible and ethical use of information and communication technologies. Such ethical ICT practices may foster more critical and responsible evaluations of emerging digital tools, including generative AI systems. Consequently, ethical awareness may promote ethical ICT use, which supports more responsible evaluation of AI tools and ultimately contributes to higher levels of AI acceptance among prospective teachers. Empirical studies support this view, highlighting the importance of ethical IT use for sustainable and responsible technology integration. Research indicates that teacher candidates who demonstrate higher levels of ethical awareness are more likely to use digital tools consciously and critically in instructional contexts (Gök, 2017; Tosun et al., 2016). Ethical challenges such as plagiarism, misuse of digital content, and violation of data privacy have been shown to negatively affect both learning quality and professional identity development among pre-service teachers (Uysal, 2006). These findings suggest that ethical IT use is closely associated with how emerging technologies are perceived and adopted.

In parallel, a growing body of research has focused on pre-service teachers' attitudes toward and acceptance of AI technologies. Studies report that positive attitudes toward AI are associated with perceived usefulness, ease of use, and beliefs about AI's potential to enhance teaching and learning (Banaz & Demirel, 2024). However, concerns related to ethical risks—such as lack of transparency, algorithmic bias, and threats to academic integrity—have been found to moderate acceptance levels (Çelik, 2023; Nguyen et al., 2022). In this regard, acceptance of GAI cannot be fully understood without considering individuals' ethical orientations toward technology use.

Recent evidence suggests a direct relationship between ethical orientations and AI-related competencies. Muzaffer and Ünal (2025) demonstrated a positive association between teachers' AI literacy and their ethical use of information and communication technologies (ICT). Similarly, Barnes et al. (2024) argue that ethical reflection is closely associated with meaningful and critical acceptance of AI systems in education. Without such reflection, acceptance may lead to uncritical adoption and potential misuse of AI tools, particularly generative systems capable of producing academic content (Dağlı et al., 2025). Despite these insights, the empirical literature examining the relationship between ethical IT use and AI acceptance remains limited. Existing studies have largely addressed these constructs separately, focusing either on ethical technology use (Erdoğan et al., 2017; Gök, 2017) or on attitudes toward and acceptance of AI (Zhang et al., 2023). Research directly linking ethical IT use to acceptance of AI—particularly generative AI—is scarce (Muzaffer & Ünal, 2025).

This gap is especially notable in the context of pre-service classroom teachers, who are expected to model ethical technology use while simultaneously integrating innovative AI tools into their future classrooms. Given the ethical challenges posed by GAI systems, such as facilitating academic dishonesty and obscuring authorship and originality (Dağlı et al., 2025), understanding how ethical IT use relates to GAI acceptance is critical. Examining this relationship can provide valuable insights into how ethical awareness may function as a protective and guiding factor in the adoption of generative AI technologies in education.

Purpose of the Study and Research Questions

Although the ethical use of IT and the acceptance of GAI have been examined separately in the literature, empirical research directly investigating the relationship between these two constructs remains limited, particularly in the context of GAI. As pre-service classroom teachers are expected to integrate emerging technologies into instructional processes while modeling ethical technology use, understanding how ethical IT use relates to GAI acceptance is important for the responsible integration of generative AI in education. Accordingly, the purpose of the present study is to examine the relationship between pre-service classroom teachers' levels of ethical use of information technologies and their acceptance of generative artificial intelligence, and to determine whether ethical IT use is associated with GAI acceptance when demographic variables are controlled.

Accordingly, the study addresses the following research questions:

1. What are the levels of ethical use of IT and acceptance of GAI among pre-service classroom teachers?
2. Is there a significant relationship between pre-service classroom teachers' levels of ethical use of IT and their acceptance of GAI?
3. To what extent do pre-service classroom teachers' levels of ethical use of IT associated with their acceptance of GAI when demographic variables are controlled?

To address the third research question, a two-step hierarchical regression model was employed. The structure of the regression models and the order in which the variables were entered into the analysis are presented in Figure 1.

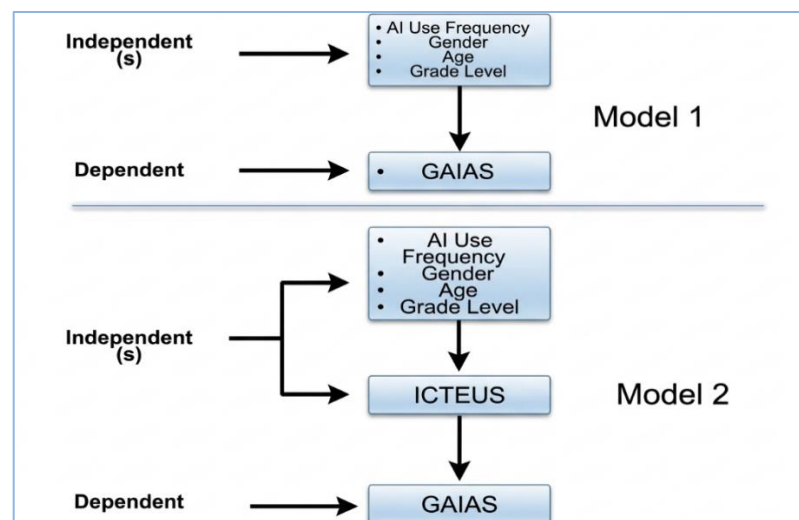


Figure 1. Conceptual framework illustrating the hierarchical associations between control variables (AI use frequency, gender, age, grade level), Information and Communication Technologies (ICTEUS), and Generative Artificial Intelligence Acceptance Scale (GAIAS).

In this study, a two-step hierarchical regression model was employed to examine the associated with GAIAS. As presented in Figure 1, Model 1 included AI use frequency and demographic variables (gender, age, and grade level) as independent variables. This model aimed to identify the predictive power of basic individual characteristics and the frequency of AI use on GAIAS. In the second step (Model 2), the ICTEUS variable was added to the analysis in addition to the variables included in Model 1. This approach allowed for the examination of the unique association of ICTEUS to GAIAS while controlling for demographic variables and AI use frequency. Figure 1 visually summarizes the structural configuration of both models and the relationships between the variables and GAIAS.

Method

Research Design

This study, which aims to examine the relationship between pre-service classroom teachers' levels of ethical use of IT and their acceptance of GAI, was designed as a correlational (relational) study within the framework of the descriptive model, one of the quantitative research methods. Correlational research refers to studies that examine the relationship between two or more variables without any manipulation or intervention (Büyüköztürk et al., 2024).

Population and Sample

The population of the study consists of pre-service classroom teachers enrolled in undergraduate Classroom Teaching programs at universities located in Gaziantep, Türkiye, during the 2024–2025 academic year. Thus, the scope of the population is limited to students receiving formal classroom teacher education within this geographical context. The sample was determined using convenience sampling, based on accessibility and voluntary participation. Prior to data collection, permission was obtained from the relevant course instructors, and the data collection process was conducted before class hours in courses attended by pre-service classroom teachers. Data were collected using an online questionnaire prepared via Google Forms, which was shared with students during the authorized course sessions. A total of 337 pre-service classroom teachers participated in the study. Of these participants, 135 were enrolled at Hasan Kalyoncu University, while 202 were enrolled at Gaziantep University, including students from the Faculty of Education (Gaziantep campus) and the Nizip Faculty of Education. Due to the voluntary nature of participation and the use of an online data collection tool, the exact number of students who were reached but chose not to participate could not be determined.

All questionnaires included in the analysis were fully completed, as the online form required responses to all scale items; therefore, no missing data were observed. In addition, no cases were excluded during the data screening process, and no outlier elimination was performed, as all responses fell within the expected value ranges of the measurement instruments. Demographic characteristics of the sample are presented in Table 1.

Table 1. Demographic characteristics of the study group

Demographic Variables		n	%
Gender	Female	276	81.9
	Male	61	18.1
Age	17-21	259	76.8
	22-26	69	20.5
	27 and above	9	2.7
Grade Level	1 st Year	94	27.9
	2 nd Year	96	28.5
	3 rd Year	116	34.4
	4 th Year	31	9.2
AI Use Frequency	Never	45	13.4
	Rarely	94	27.9
	Sometimes	142	42.1
	Frequently	56	16.6

As presented in Table 1, the majority of the participants were female (81.9%), while 18.1% were male. In terms of age distribution, most participants were between 17 and 21 years old (76.8%), followed by those aged 22–26 (20.5%), and 27 years and above (2.7%). Regarding grade level, the largest proportion of participants were third-year students (34.4%), followed by second-year (28.5%), first-year (27.9%), and fourth-year students (9.2%). With respect to AI use, 42.1% of the participants reported using AI sometimes, 27.9% reported rare use, 16.6% reported frequent use, and 13.4% reported never using AI.

Data Collection Tools

The data of the study were collected using three instruments: a demographic information form, the "Generative Artificial Intelligence Acceptance Scale (GAIAS)" developed by Karaoğlan-Yılmaz et al. (2024) to determine pre-service classroom teachers' levels of acceptance of GAI, and the "Information and Communication Technologies Ethical Use Scale (ICTEUS)" developed by Konuk (2023) to assess their ethical use of ICTs.

Demographic Information Form

This form, developed by the researchers, consists of four questions related to participants' age, gender, and year of study.

Generative Artificial Intelligence Acceptance Scale (GAIAS)

To determine participants' acceptance levels of GAI, the GAIAS was used. This scale was developed by Karaoğlan-Yılmaz et al. (2024) and colleagues based on the unified theory of acceptance and use of technology. The scale aims to measure university students' acceptance of GAI tools. It consists of 20 items rated on a 5-point Likert scale (1: Strongly

Disagree to 5: Strongly Agree) and includes four subdimensions. Sample items, factor structure, and internal consistency coefficients of the scale are presented in Table 2.

Table 2. Sample items, factor structure, and reliability of the GAIAS

Factors	Sample Items	No	α
<i>Performance expectancy</i>	Generative AI applications help me get things done faster.	3	.71
<i>Effort expectancy</i>	I think it is easy to leverage generative AI applications.	9	.82
<i>Facilitating conditions</i>	I can get help from others when I have difficulties in using generative AI applications.	14	.85
<i>Social influence</i>	People who are important to me are using generative AI applications.	19	.85

Information and Communication Technologies Ethical Use Scale (ICTEUS)

To assess participants' ethical use of IT, the ICTEUS was utilized. This scale was developed by Konuk (2023) to measure the ethical use levels of IT among pre-service teachers. The ICTEUS includes 38 items rated on a 5-point Likert scale (1: *Strongly Disagree* to 5: *Strongly Agree*) and consists of four subdimensions. Sample items, factor structure, and internal consistency coefficients of the scale are presented in Table 3.

Table 3. Sample items, factor structure, and reliability of the ICTEUS

Factors	Sample Items	No	α
<i>Ethical Awareness</i>	I am able to recognize malicious messages or emails sent to me.	9	.58
<i>Communication & Respect</i>	I make an effort to follow spelling and grammar rules when communicating in digital environments.	13	.60
<i>Cybercrime</i>	If I had the opportunity, I would use artificial intelligence for harmful purposes.	26	.93
<i>Intellectual Property</i>	I use others' statements or posts on the internet only with permission or by providing proper citation.	35	.74

Data Collection Process

The data for the study were collected during the fall semester of the 2024–2025 academic year. The research process was conducted in accordance with relevant ethical principles. The data were collected through face-to-face administration by reaching pre-service classroom teachers studying at the universities determined by the researchers. During the data collection process, the researchers entered the classrooms, obtained the necessary permissions from the instructors, and distributed the data collection tools directly to the participants, administering them within the classroom setting.

Before data collection, participants were informed about the purpose of the research and the principles of confidentiality, and the data were collected on a voluntary basis. Three instruments were used in the study: the "Demographic Information Form", the "GAIS", and the "ICTEUS". The obtained data were coded for analysis using the SPSS 23 program, and incomplete or incorrect data were removed before initiating the analysis process.

Data Analysis

The data were analyzed using the IBM SPSS Statistics 23 software package. Descriptive statistics (minimum, maximum, mean, and standard deviation) were calculated to summarize participants' scores on the study variables. Pearson product-moment correlation analysis was conducted to examine the relationships among ethical IT use, GAI acceptance, and their respective subdimensions. To examine the predictive role of ethical IT use on GAI acceptance while controlling for demographic variables, a hierarchical multiple linear regression analysis was performed. In the first step of the regression model, gender, age, grade level, and AI use frequency were entered as control variables. In the second step, ethical IT use (ICTEUS total score) was added to the model to examine its unique association with GAI acceptance (GAIAS total score).

For the descriptive evaluation of the scale scores, the following score intervals were used: 1.00–1.80: *Strongly Disagree / Very Low*, 1.81–2.60: *Disagree / Low*, 2.61–3.40: *Neutral / Moderate*, 3.41–4.20: *Agree / High*, 4.21–5.00: *Strongly Agree / Very High*

The strength of the Pearson correlation coefficients was interpreted as follows (absolute values): 1.00: *Perfect correlation*, .71–.99: *Strong correlation*, .30–.70: *Moderate correlation*, .01–.29: *Weak correlation*, 0: *No correlation*

Validity and Reliability

To ensure the validity and reliability of the research, the development processes of both GAIAS and ICTEUS were thoroughly examined. The results of this examination showed that both scales met the necessary validity and reliability standards. Additionally, Cronbach's alpha coefficients were calculated for all items and subdimensions of the scales. The high alpha values indicated strong internal consistency. The research process was conducted in adherence to ethical standards. Permission for scale use was obtained from the original authors, and ethical approval was granted by Hasan Kalyoncu University's Ethics Committee.

Throughout the data collection process, the voluntary nature of participation was emphasized, and participants were adequately informed about the study's purpose and procedures. The collected data were reviewed, cleaned, and prepared for statistical analysis using SPSS.

Findings

The first sub-problem of the study was stated as: "What are the levels of ethical use of IT and acceptance of GAI among pre-service classroom teachers?" The results of the descriptive statistical analysis related to this sub-problem are presented in Table 4.

Table 4. Descriptive statistics of the ICTEUS and GAIAS scores of pre-service classroom teachers

Variables	Min	Max	\bar{X}	SD
ICTEUS	1.95	5.00	4.06	.54
<i>Ethical Awareness</i>	1.00	5.00	3.73	.71
<i>Communication & Respect</i>	1.40	5.00	4.23	.67
<i>Cybercrime</i>	1.00	5.00	4.47	.91
<i>Intellectual Property</i>	1.00	5.00	3.66	.87
GAIAS	1.00	5.00	3.76	.77
<i>Performance Expectancy</i>	1.00	5.00	3.91	.84
<i>Effort Expectancy</i>	1.00	5.00	3.73	.92
<i>Facilitating Conditions</i>	1.00	5.00	3.84	.87
<i>Social Influence</i>	1.00	5.00	3.54	.93

$n=337$

As shown in Table 4, the mean score of ICTEUS ($\bar{x} = 4.06$, $SD = .54$) was higher than that of GAIAS ($\bar{x} = 3.76$, $SD = .77$). Regarding the subdimensions of ICTEUS, the highest mean score was observed for cybercrime ($\bar{x} = 4.47$, $SD = .91$), followed by communication and respect ($\bar{x} = 4.23$, $SD = .67$), ethical awareness ($\bar{x} = 3.73$, $SD = .71$), and intellectual property ($\bar{x} = 3.66$, $SD = .87$). For GAIAS, the subdimension with the highest mean was performance expectancy ($\bar{x} = 3.91$, $SD = .84$), followed by facilitating conditions ($\bar{x} = 3.84$, $SD = .87$), effort expectancy ($\bar{x} = 3.73$, $SD = .92$), and social influence ($\bar{x} = 3.54$, $SD = .93$).

The second sub-problem of the study was formulated as: "Is there a significant relationship between pre-service classroom teachers' levels of ethical use of IT and their acceptance of GAI?" The results of the correlation analysis conducted to address this sub-problem are presented in Table 5.

Table 5. Correlation coefficients between ICTEUS and GAIAS scores

Variables	1	2	3	4	5	6	7	8	9	10
ICTEUS	1									
<i>Ethical Awareness</i>	.68**	1								
<i>Communication & Respect</i>	.83**	.55**	1							
<i>Cybercrime</i>	.64**	.05	.33**	1						
<i>Intellectual Property</i>	.61**	.37**	.53**	.08	1					
GAIAS	.36**	.44**	.38**	-.03	.32**	1				
<i>Performance Expectancy</i>	.34**	.36**	.33**	.04	.28**	.89**	1			
<i>Effort Expectancy</i>	.32**	.44**	.33**	-.06	.31**	.88**	.68**	1		
<i>Facilitating Conditions</i>	.38**	.42**	.41**	.02	.30**	.87**	.69**	.82**	1	
<i>Social Influence</i>	.22**	.30**	.29**	-.010	.24**	.83**	.62**	.60**	.64**	1

As shown in Table 5, at the level of the main variables, a positive and statistically significant correlation was found between ICTEUS and GAIAS ($r = .36, p < .01$). In terms of the relationships between GAIAS and the subdimensions of ICTEUS, statistically significant positive correlations were observed with ethical awareness ($r = .44, p < .01$), communication and respect ($r = .38, p < .01$), and intellectual property ($r = .32, p < .01$). In contrast, the correlation between GAIAS and cybercrime was negative and not statistically significant ($r = -.03, p > .05$).

Regarding the internal structure of ICTEUS, positive and statistically significant correlations were found between ICTEUS and all of its subdimensions, including ethical awareness ($r = .68, p < .01$), communication and respect ($r = .83, p < .01$), cybercrime ($r = .64, p < .01$), and intellectual property ($r = .61, p < .01$). Similarly, GAIAS demonstrated strong, positive, and statistically significant correlations with each of its subdimensions, namely performance expectancy ($r = .89, p < .01$), effort expectancy ($r = .88, p < .01$), facilitating conditions ($r = .87, p < .01$), and social influence ($r = .83, p < .01$).

The third sub-problem of the study was: "To what extent do pre-service classroom teachers' levels of ethical use of IT associated with their acceptance of GAI when demographic variables are controlled?" The results of the hierarchical multiple regression analysis conducted to answer this question are presented in Table 6.

Table 6. Hierarchical multiple regression analysis related to GAIAS

Model	Variables	B	SE B	β	t	p
Model 1	Constant	3.13	.39	-	7.94	.00
	AI use frequency	.32	.04	.38	7.43	.00
	Gender	.14	.10	.07	1.37	.17
	Age	-.01	.02	-.04	-.65	.52
	Grade level	-.04	.05	-.05	-.93	.36
	R = .387, R ² = .150 F(4, 332) = 14.60, p < .001					
Model 2	Constant	1.39	.45	-	3.08	.00
	AI use frequency	.28	.04	.34	6.86	.00
	Gender	.23	.10	.11	2.32	.02
	Age	-.03	.02	-.07	-1.27	.21
	Grade level	-.01	.04	-.01	-.22	.82
	ICTEUS	.47	.07	.33	6.76	.00
R = .503, R ² = .253, ΔR^2 = .103 F(5, 331) = 22.38, p < .001						

As shown in Table 6, the first model, which included demographic variables and AI use frequency, was statistically significant and accounted for 15% of the variance in GAIAS.

Among the control variables, AI use frequency was the only variable significantly associated with GAIAS ($\beta = .38, p < .001$).

The inclusion of ICTEUS in the second model resulted in a significant strengthening of the observed relationships ($\Delta R^2 = .103, p < .001$), with the final model explaining 25.3% of the variance in GAIAS. ICTEUS demonstrated a moderate, positive, and statistically significant association with GAIAS ($\beta = .34, p < .001$), even after controlling for demographic characteristics and AI use frequency. In the second model, gender also emerged as a statistically significant variable ($\beta = .11, p = .021$), whereas age and grade level were not significantly associated with GAIAS in either model. Overall, the findings indicate that higher levels of ethical IT use are associated with higher levels of GAI acceptance among pre-service classroom teachers, beyond the effects of demographic factors and AI use frequency.

Discussion, Conclusion and Recommendations

The results of the study indicate that pre-service primary school teachers exhibit a high level of ethical use of IT. Examination of the sub-dimensions of the relevant scale revealed that participants' awareness of cybercrime and their communication and respect skills were very high, whereas their ethical awareness and understanding of intellectual property were high. While numerous studies in the literature similarly report high ethical awareness among teacher candidates (Banaz & Demirel, 2024; Erdoğan et al., 2017; Gök, 2017; Özbay et al., 2021).

Tosun et al., (2016), the unique contribution of the current study lies in demonstrating how this existing ethical foundation serves as a critical prerequisite for navigating the complexities of emerging generative AI tools. Rather than merely reiterating demographic differences in ethical behavior, these findings suggest that pre-service teachers are already equipped with a foundational digital citizenship mindset, which is essential for the responsible integration of complex sociotechnical systems like GAI into their future classrooms.

This finding becomes particularly meaningful when considered in light of recent discussions on the ethical challenges associated with AI integration in education. Previous studies have emphasized that the rapid expansion of digital technologies has intensified ethical concerns such as plagiarism, copyright violations, and misuse of digital information (Tosun et al., 2016). Moreover, the emergence of generative AI systems capable of producing academic content has further complicated issues related to authorship, originality, and

academic integrity (Dağlı et al., 2025). In this context, the high levels of ethical IT use observed among pre-service teachers in the present study may indicate that future educators possess a foundational ethical awareness that could function as a protective factor against the potential misuse of generative AI tools.

Specifically, Nair and Karan (2024) confirmed a positive correlation between pre-service teachers' attitudes and their use of information technologies, while Mrisho (2023) highlighted that ethical attitudes toward IT support the digital transformation process in education. Similarly, Özbay et al. (2021) found that ethical IT use varied according to gender, department, internet usage experience, participation in IT ethics seminars, and awareness of cybercrimes. Previous studies also reveal nuanced patterns: female pre-service teachers often demonstrate higher ethical awareness (Uysal, 2006), whereas higher family income, advanced web design and programming skills, or frequent computer use can sometimes correspond to lower ethical IT use (Uysal, 2006). Additionally, department-specific differences were observed, with Computer Education and Instructional Technology students showing high ethical IT use online, though less sensitivity toward copyright issues (Erdoğan et al., 2017).

However, these patterns also point to a broader issue frequently emphasized in the literature: technological competence alone does not necessarily guarantee ethical technology use. As noted by Barnes et al. (2024), ethical reflection is an essential component of meaningful engagement with emerging technologies, particularly AI systems. Individuals may possess strong technical skills yet still struggle to critically evaluate the ethical implications of technology use. Therefore, ethical ICT use should be considered an integral dimension of digital literacy rather than merely a behavioral outcome, reinforcing the importance of embedding ethical reflection within teacher education programs.

Another key finding of the study is that the acceptance of GAI among pre-service primary school teachers is high. Analysis of the sub-dimensions of the GAI acceptance scale indicated that participants reported high levels of performance expectancy, effort expectancy, facilitating conditions, and social influence. Evaluated through the lens of the UTAUT and the TAM, these results indicate that teacher candidates perceive GAI not just as a novel trend, but as a functionally useful and accessible pedagogical instrument. However, in line with the TPB, this high acceptance is not solely driven by the technological features of AI; the social influence and facilitating conditions dimensions underscore that broader

normative beliefs and supportive environments heavily shape their intention to adopt these tools.

This aligns with previous research indicating generally positive attitudes toward AI, though results vary depending on technological literacy, prior experience, and personal characteristics (Banaz & Demirel, 2024; Mart & Kaya, 2024). For example, Banaz and Demirel (2024) reported high awareness of AI technologies among pre-service teachers, whereas Mart and Kaya (2024) found that insufficient technological literacy limited GAI acceptance among preschool teacher candidates.

These findings also resonate with broader discussions in the literature regarding the increasing role of AI in transforming educational practices. Scholars have argued that AI technologies can support personalized learning, instructional design, and assessment processes (Seo et al., 2025). Within this context, the high acceptance of GAI observed in the present study may indicate that pre-service teachers are beginning to perceive generative AI not merely as a technological novelty but as a pedagogically relevant tool that can support teaching and learning processes. Such perceptions may contribute to the gradual normalization of AI-assisted practices in educational environments.

A positive and moderate relationship was identified between pre-service teachers' ethical IT use and GAI acceptance. This suggests that teacher candidates with higher GAI acceptance also tend to use IT ethically, which is consistent with findings reported by Muzaffer and Ünal (2025), who similarly identified a positive and moderate relationship between AI-related competencies and ethical IT use. Further analysis revealed that AI acceptance was moderately and positively associated with ethical awareness, communication and respect, and intellectual property, but not with the cybercrime dimension. This pattern is theoretically meaningful, as GAI tools are typically perceived as pedagogical, creative, and productivity-oriented rather than as technologies primarily associated with cybercrime or digital security threats. Ethical considerations requiring reflective judgment, responsible social interaction, and sensitivity to authorship may thus be more directly engaged in the context of GAI use, while security-focused ethical concerns remain peripheral.

This result is also consistent with studies highlighting that the ethical challenges of AI in education are more closely related to transparency, fairness, authorship, and accountability rather than purely technical security risks (Çelik, 2023; Oviedo-Trespalacios et al., 2023). Because generative AI systems directly participate in the production of educational

content, users are more likely to reflect on issues of originality, intellectual ownership, and responsible academic practices. Consequently, ethical awareness related to communication, respect, and intellectual property may play a more immediate role in shaping attitudes toward GAI compared to cybercrime-related concerns.

Finally, hierarchical regression analysis showed that ethical IT use significantly associated with higher levels of GAI acceptance after controlling for demographic variables and GAI use frequency. The inclusion of ethical IT use strengthened the observed relationships, with the final model explaining 25.3% of the variance in GAI acceptance. These results suggest that ethical orientations toward technology are closely related to teacher candidates' acceptance of generative GAI beyond demographic factors and prior GAI experience, emphasizing the importance of ethical technology use in GAI readiness across different stages of the teaching profession.

Importantly, this finding contributes to the growing body of research emphasizing that ethical awareness is a key component of responsible AI integration in education (Barnes et al., 2024; Nguyen et al., 2022). Rather than acting as a constraint that limits technology adoption, ethical reflection may function as a critical cognitive mechanism that enables individuals to evaluate emerging technologies more thoughtfully and integrate them more responsibly. In this sense, ethical ICT use may serve as a foundational dimension of AI readiness, supporting balanced and critically informed engagement with generative AI tools in educational contexts.

Recommendations

Considering the relational nature of the findings, which indicate a positive association between pre-service teachers' ethical use of IT and their acceptance of GAI, it is first recommended that future research further examine this relationship across different ethical dimensions and educational contexts, particularly in response to emerging ethical concerns surrounding GAI integration. Building on this evidence, educational policies and teacher education practices should adopt Education 5.0-oriented, multi-layered ethical frameworks that conceptualize GAI integration not merely as a technical endeavor but as an ethical, pedagogical, and governance-related process. Such frameworks should emphasize critical, ethical, and human-centered uses of technology to support digital citizenship through meaningful, contextualized, and inclusive pedagogical strategies (Varol, 2025). Within this broader perspective, teachers should be equipped to use AI in reliable,

transparent, and equitable ways by prioritizing accountability, fairness, and ethical responsibility, and by integrating computational technologies into teaching and learning through innovative yet socially responsible, sociotechnically informed approaches that support the ongoing development of education for the future (Hagendorff, 2022).

Limitations and Future Research

This study has several limitations that should be considered when interpreting the findings. First, the correlational research design does not allow for causal interpretations regarding the relationship between ethical IT use and GAI acceptance. Longitudinal or experimental studies are needed to examine how these constructs are related to each other over time. Second, the use of convenience sampling limits the generalizability of the findings. Future research should include more diverse samples from different regions and teacher education programs to strengthen external validity. Third, data were collected through self-report instruments, which may be affected by social desirability bias, particularly in the measurement of ethical behaviors. Future studies could employ mixed-method designs, including qualitative interviews or scenario-based assessments, to gain deeper insight into how ethical IT use is enacted in practice. Finally, although demographic variables and GAI use frequency were controlled for, other potentially influential factors—such as AI literacy—were not included. Future research may benefit from testing mediation or moderation models to provide a more comprehensive explanation of GAI acceptance among pre-service teachers.

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Author Contribution Statement

Mustafa TAŞÇILAR: *Data collection, literature review, data organisation, revision, writing, review & editing.*

Zehra YAŞAR SAĞLIK: *Conceptualization, theoretical framing, methodology, data analysis, interpretation of results, writing – original draft, visualization, review & editing.*

Ayşenur DAĞDEVİREN: *Data collection, literature review, data curation, data organisation.*

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